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Essays in Household Finance

Proefschrift

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Contents

Introduction

Household finance is a young and vibrant research field that continuously attracts public attention. There may be very few matters that the people care so much about as their personal finance. The recent rise of academic and policy interest in household finance is largely due to the rise in the market share of household assets and liabilities in the overall financial industry and households' more active role in financial decisions. These decisions include, but are not limited to:

1. choice of *the financial markets* to participate in, and if so, how much to invest in each of them, i.e., how to allocate the financial portfolio among these different assets;
2. choice of *the financial instruments* to be used (such as insurance and loans);
3. choice of *the financial intermediaries (banks)* and the dynamics of the household-bank relationship.

In this thesis, I empirically investigate these topics and their interlinkages by micro-econometric analysis of household-level survey data.

In Chapter 1, I relate topics 1 and 2, by associating the households' portfolio choice to a public health insurance design. Previous literature identified that health risk plays an important role in the household's decision to invest in risky assets. Using a cross-country household survey of the elderly (the Survey of Health, Aging and Retirement in Europe), I document the role of health care system generosity for the households' portfolio choice and a complementary protection provided through a family care. Namely, I find that the portfolio composition is sensitive to both self-reported health status and to the bequest motives, but only in the countries that lack a full-coverage National Health System. The rationale is, that in these countries there is less financial protection against out-of-pocket medical expenditures, so when falling sick people compensate this risk by reducing their risk

exposure elsewhere e.g., shying away from stocks. Furthermore, the people can use the bequest to bargain care from their children by promising them inheritance, which may encourage the stockholding. The empirical findings in chapter 1 support both claims.

In Chapter 2, I investigate topic 3 using the Italian household panel survey provided by the Bank of Italy (the Survey of Household Income and Wealth). Specifically, I investigate the determinants of household's decision to switch its bank in particularly focusing on the features of their relationship. From both banks' and regulator's perspective it is important to know what characteristics affect the 'stability' of a deposit. Despite this relevance, there is little research on the dynamics of household-bank relationship over time. Banks can affect the relative stability of their deposits through their relationship with the clients and by attracting more stable clients. The results in chapter 2 show that clients having a well-embedded relationship with the bank, as measured by an exclusive relationship (i.e., using only one bank) and/or using more bank services, are less likely to switch their bank. I also document that this decision is strongly positively correlated with both taking out and paying off a mortgage. As for the household characteristics, I find that household size, marital status, education and financial literacy are associated with the decision to change bank, whereas mobility and the overall economic condition of the household are not. Some of the characteristics of the discarded bank also matter, with the cooperative banks being significantly less likely to be abandoned.

In Chapter 3, using the same data source, I relate topics 2 and 3. I study the importance of the mortgage refinancing costs in retail banking. Switching costs can be an important distorter of competition in many markets, including banking, and have received significant attention in both academic and policy discussions. However, assessing the impact of these costs on client and bank behaviour imposes a challenge to devise a convincing identification strategy. I exploit an exogenous source of variation to switching costs in the mortgage market (commonly referred to as the "refinancing costs") brought forward by a legal change in Italy known as the Bersani Law, which allows me to identify a causal effect of the reform to bank switching of the mortgage holders. Nevertheless, I find that the effect is present only for more educated individuals and less competitive markets, highlighting the defining role of household sophistication and market competition. In addition to affecting the switching

behaviour of extant mortgage holders, I also document that the Bersani Law made "mortgage shopping" (switching a bank when taking out a mortgage) more widespread. The latter finding indicates that the newly increased flexibility in the mortgage market increased the bank competition for new clients and decreased the clients' inertia.

Chapter 1

Household Portfolio Choice and Health Care Systems

Abstract

Previous literature identified that health risk plays an important role in household's decision to invest in risky assets. This paper investigates whether association of health status with household's portfolio riskiness varies across 11 European countries with varying generosity of health care systems. The data are drawn from the Survey of Health, Aging and Retirement in Europe (SHARE) that surveys the elderly population. The results show that worse (self-perceived) health status is associated with less risky portfolio holdings only in countries that lack a full-coverage National Health System. Furthermore, the informal care arrangements (in form of a strategic promise of inheritance) seem to be de facto complementary to the less generous publicly organized health care provision in these countries. This result indicates a spillover of health-related financial risks of the elderly to younger individuals, who are not included in the SHARE sample.

Keywords: health status, household portfolios, imputation

JEL Classification: C81; D14; G11: I13

1.1 Introduction

Based on the World Health Organization 2012 report covering 90% of the world's population, an estimated 100 million people are pushed under the poverty line each year simply because they use the health services for which they are forced to pay out of their own pockets.[1] Bankruptcy scenarios induced by the medical expenditures are present both in the poor and rich countries (Xu et al., 2003), and both for the poor and rich individuals (Himmelstein et al., 2005). In Europe, due to the population ageing, the health care expenditures became increasingly important over the last few decades.[2] These developments raised a particular concern among the EU countries, which are bounded by the 1992 Maastricht Treaty's stringent spending rules. Hence, following the Treaty, and being faced with the rising health care costs, the EU countries introduced the restrictive fiscal policies which reduced the generosity of their health care systems. These reforms faced the patients with either rationing or an increase in the co-payments to access the publicly provided health care services, both increasing the unexpected out-of-pocket (OOP) expenditure, thus the overall household's financial risk. As the background risk theory suggests, this vulnerability may drive the households to adjust their exposure to other types of risks (Gollier and Pratt, 1996 and Goldman and Maestas, forthcoming) such as a rate-of-return risk of their portfolio.

The previous literature documented that the health status is associated with the portfolio riskiness, on both the extensive margin (willingness to hold a particular type of asset) and the intensive margin (share of financial wealth held in each asset category) of portfolio choice.[3] However, a generous health insurance may mediate the risk of a medical expenditure, thus weakening the association of portfolio choice and health status. To empirically test this theoretical prediction, the cross-country analysis offers a natural source of variation in household's (expected) health-related expenditures given the heterogeneity of the corresponding health care systems that shield from these expenditures to different extents. Our main hypothesis may be formalized as follows: ceteris paribus, poorer health increases

[1] To simplify comparability across countries and over time, the poverty line has been standardized as a daily income of US$ 1 at the international standards. The World health statistics 2012 (page 40), available at: http://www.who.int/gho/publications/world_health_statistics/EN_WHS2012_Full.pdf

[2] More details on the phenomenon of "population ageing" are available at: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Population_structure_and_ageing.

[3] See e.g., Rosen and Wu (2004) and Edwards (2008).

the risk of out-of-pocket medical expenditures which drives the household away from other sources of risk, resulting in less risky portfolio holdings. However, the strength of this association is lower in the countries that have a highly protective publicly provided health care systems. Thus, in this paper, we test whether the lack of such a generous health care system increases the sensitivity of the household portfolio choice to its (self-perceived) health status.

Using a rich dataset from the Survey of Health, Aging and Retirement in Europe (SHARE), Atella et al. (2012) contribute to the literature by exploiting the heterogeneity of the health care systems in 10 European countries and focus on the association of health risk and household's propensity to hold risky assets (extensive margin of portfolio choice). In line with the theoretical prediction, their results highlight the importance of the health care system in mediating households' health risk through the medical expenditure channel. Further research is needed to investigate the role of the health care systems for the portfolio share allocated to those assets (intensive margin of portfolio choice) as a closer measure of the risk that a household chooses to bear. Additionally, from a methodological point of view, being a large household survey, the SHARE suffers from a high item non-response rate, which can substantially bias estimates and lead to a large efficiency loss, especially with many variables entering a regression equation. To fill in these gaps, our study employs the multiple imputation analysis of the SHARE data to investigate importance of the health care systems for the household portfolio choice on both extensive and intensive margins. After controlling for many potentially confounding factors, our results show that worse (self-reported) health status implies lower propensity to hold stocks and lower share allocated to them, but these associations are present only in countries that lack a full-coverage National Health System. The results further indicate that less generous publicly organized health care provision in these countries seems to be de facto complemented by the informal care arrangements through a family network.

The rest of the paper is organized as follows: Section 2 reviews previous theoretical and empirical literature to understand the question of interest and delimit the variables to be used in the analysis; Section 3 discusses the methodological approach to the analysis; Section 4 describes the data; Section 5 presents the empirical findings; Section 6 concludes.

1.2 Previous literature

The traditional portfolio theory states that an investor's willingness to take financial risks depends only on her risk aversion and investment opportunities.[4] This conjecture has a strong implication that although the households have highly heterogeneous characteristics, their portfolios should share a few common features: each household should invest at least some amount in stocks in order to profit from excess return they provide, all investors should hold the same portfolio of risky securities and these portfolios should be well diversified (all risky assets should be included).

Despite the uniformity predicted by the traditional theory, there is high heterogeneity in the investors' observed behavior. Among the stockholders, there is a considerable heterogeneity of share of assets invested in stocks, with the overall distribution of portfolio allocation being highly positively skewed - many households have risky share equal to zero, thus opt out of the stock market entirely. This phenomenon, dubbed the "*stockholding puzzle*," represents a partial equilibrium counterpart of the "*equity premium puzzle",* and receives a great attention in the literature, posing a challenge to both portfolio choice and asset pricing theory (Bertraut and Haliassos, 1995). Another empirical finding is that the portfolios are usually weakly diversified.

These empirical observations do not necessarily imply that any of the investors is making a mistake or that the revealed preference theory should be abandoned, if one considers that the indiviuals may have different preferences and face different circumstances (Curcuru et al., 2009). To account for this, the empirical literature aimed to single out variables that might help explain portfolio choice observed in the microeconomic data. The literature documents vast and systematic differences in portfolios of individuals with varying attributes (see Curcuru et al., 2009 for an excellent summary) such as their socio-economic characteristics (income and wealth), and demographic characteristics ranging from age (Guiso et al., 2002; Brunetti and Torricelli, 2010) to education (Vissing-Jørgensen, 2002), cognitive abilities (Christelis et al., 2010), gender and marital status (Bertocchi et al., 2011).

[4] See Gollier (2002) for a good survey.

Therefore, unlike the traditional finance theories, the recent literature (including the background risk literature), allows for many factors other than the risk aversion and the investment opportunities to affect the portfolio choice. The background risk theory states that, under some regularity assumptions on preferences[5] when faced with some unavoidable (or non-fully insurable) risk (dubbed *"background risk"*) individuals tend to reduce their exposure to avoidable ones (Kimball, 1993; Pratt & Zeckhauser, 1987; Elmendorf and Kimball, 2000), such as investing in the risky assets.[6] Eeckhoudt and Kimball (1992) show that an agent's willingness to bear other risks in presence of a background risk decreases whether or not the two risks are correlated. Thus, reducing (one part) of the background risk can increase investment in risky assets, even if the reduced risk is uncorrelated with that of the risky assets (Gollier and Pratt, 1996).

There is a large literature analyzing labor income as a source of background risk (see e.g., Guiso and Paiella, 2008). The labor income uncertainty may be particularly important among the younger and middle-aged individuals, but for the older population the health risk might be even more important since the health status declines with age and many elderly are already retired (or close to the end of their working age). The health risk, as a source of background risk, entails both direct (i.e., the healthcare expenditure which increases the marginal utility of wealth by absorbing it) and indirect costs (i.e., the loss of labor income due to the reduced productivity) for the household. However, the insurance coverage decreases the risk of out-of-pocket medical expenditure, thus reducing the household's overall background risk (Edwards, 2008; Yogo, 2009).

Empirical literature widely acknowledges that the health risk is a significant determinant of household's portfolio choice. Using the US Health and Retirement Survey (HRS), Rosen and Wu (2004) find health risk to be significant in explaining both the stock participation and the portfolio allocation. Interestingly, they show that this negative association is not driven by the "third variables" that simultaneously affect the health and the financial decisions, such as the family background, the industry and the occupation and that it does not seem to operate through the effect of health status on individuals' risk aversion,

[5] More specifically, the property of continuously differentiable utility functions with derivatives that alternate in sign (e.g., Gollier and Pratt, 1996).
[6] Such "proper risk aversion" characterizes most of the commonly used utility functions.

the planning horizons or their health insurance status. Edwards (2008) presents a theoretical model of portfolio choice in which the current health status and expectations about the future medical expenditure burden determine portfolio shares, and using the HRS and the Survey on Assets and Health Dynamics Among the Oldest Old (AHEAD) he finds that the risky share is decreasing in both variables. Goldman and Maestas (forthcoming) document that among the Medicare beneficiaries who own different forms of supplementary health insurance and, thus, have different exposure to medical expenditure risk, those who face less of this risk are more likely to hold risky financial assets.

Health is a risky asset itself, so the fundamental question is whether the individuals can adequately insure against it (Edwards, 2008). Health risk is insurable, but markets are imperfect, thus in analyzing the financial implications of health risk, type of the health care system in place may play a central role. The national full-protective insurance may be particularly important in shielding the households from the health-related financial risk. As Goldman and Maestas (forthcoming) emphasize "*health risk and medical expenditure risk are closely related, but they are distinct sources of background risk."* Atella et al. (2012) add that *"the former is a sole function of the actual health condition of household members, while the latter depends not only on health risk but also on health insurance coverage. In turn, health insurance coverage varies among countries due to different health care systems."*

Guiso and Sodini (2012) emphasize that financial decisions and risk-taking by individuals is, indeed, likely to vary relative to the economic and institutional environment where decisions are being made. To this end, the cross-country (or cross-state) data is a natural source of variation. Recently, Mahoney (forthcoming) exploits the variation in the design of the bankruptcy laws across the US states to show that the bankruptcy provides the households with an implicit health insurance. This protection, in turn, affects their out-of-pocket medical expenditure (conditional on the care provided) and their demand for the health insurance. Using the SHARE data and exploiting the heterogeneity of health care systems across Europe, Atella et al. (2012) study the medical expenditure channel of the effect of health status on the extensive margin of the households' portfolio choice. They find evidence by probit analysis that it is only in the countries with less generous health systems that worse (self-reported) health status is associated with lower probability of holding risky assets.

Christelis et al. (2010) examine the role of the cognitive abilities in shaping the portfolio choice in the SHARE data using the multiple imputations analysis, and find that the cognitive abilities are positively associated with the probability of holding risky assets, but do not affect the share invested in them. The authors draw attention to the importance of accounting for the high item non-response rates in the SHARE. The survey provides the multiple imputed values for a set of variables including the economic variables, the numeracy and the perceived health status for both the respondents and the non-responding partners (NRPs). Christelis (2011) emphasizes that the analyses based only on the observations with the complete records, since information is unlikely to be missing completely at random, are likely to be biased and inconsistent (Rubin, 1987; Little and Rubin, 2002). This is especially the case in the scenario of the high incidence of missing data, as in the SHARE, since omitting the respondents that do not have the complete records are likely to result in the small and non-representative samples.

In sum, the previous literature on health risk as a source of background risk widely acknowledges its effect on the households' portfolio choice. However, the previous work mainly uses the US data, with the European countries rarely considered, especially in analyzing the intensive margin of such association. This paper studies the relation of the health status and the households' portfolio choice on both extensive and intensive margin, through its effect on the out-of-pocket medical expenditure, particularly focusing on the role of the health care systems. From the methodological point of view, the analysis follows Christelis et al. (2010) and uses the multiple imputation analysis to obtain more reliable estimates.

1.3 Methodological approach

The unit of analysis is a household, since some information in the data source is available only at the household level. This is a standard data constraint in the related literature, with few exceptions (e.g., Calvet, Campbell and Sodini, 2009).

The households invest their financial assets across different financial instruments with different levels of riskiness. Most of the previous contributions to the literature (recently e.g., Christelis et al., 2010, and Atella et al., 2012) model the participation decision with

probit, whereas for the allocation decision there are variety of econometric approaches. Heaton and Lucas (2000) focus on the individuals who hold stocks above a certain threshold and use the ordinary least squares (OLS) estimation, while Curcuru et al. (2009) use the OLS on a sample restricted to the stockholders. Bertaut and Starr-McCluer (2002) and Christelis et al. (2010) use the Heckman's selectivity adjusted model to account for the fact that many households do not hold any risky assets. Guiso et al. (1996), Poterba and Samwick (2003), Rosen and Wu (2004), and Edwards (2008) use the tobit estimator instead. While each of these approaches has its pros and cons, this paper opts for a tobit estimator, viewed as the most suited for the analysis.[7] Namely, the problem at hand is perceived as a censored data, not a self-select data for which the Heckman model would be more suitable. More precisely, this analysis approaches the households' portfolio choice as a single decision regarding the risky assets – decision on the share to invest in them, and once they decide the risky share, the share being positive or zero implies the participation or the non-participation in risky assets. The model, thus, implicitly assumes that the same data generating process that determines the censoring is the same process that determines the outcome variable.

In the proposed econometric setting, both the participation and allocation to risky assets can be modeled as dependent on a latent variable, with the allocation regression seen as a regression with more observable information on the latent variable.

The latent variable model can be represented as:

$$Y_i^* = X_i'\beta + \varepsilon_i \qquad (1)\ ,$$

where i represents a household, X_i the observable variables affecting the latent variable, and ε_i the unobservables which are assumed to be normally distributed (standard normal for probit), so that maximum likelihood estimation can be employed.[8]

[7] Since in the SHARE data, the households do not have a high concentration of the portfolio shares close to unity, the analysis uses the simpler one-limit version of the estimator with lower limit at zero. This estimator is also used in Rosen and Wu (2004).

[8] It might not be convenient to give an economic interpretation to a latent variable, especially in the tobit estimation. Some prefer to refer to it as a desired outcome variable – thus, in the present analysis, the desired share invested in stocks.

For the participation dummy variable Y_i^p, we observe 1 if $Y_i^* \geq 0$ and 0 otherwise. This can be written as:

$$Y_i^p = \begin{matrix} 1 \text{ if } Y_i^* \geq 0 \\ 0 \text{ if } Y_i^* < 0 \end{matrix}$$

For the allocation (share) variable Y_i^a, we observe Y_i^* if $Y_i^* \geq 0$ and 0 otherwise. This can be written as:

$$Y_i^a = \begin{matrix} Y_i^* \text{ if } Y_i^* \geq 0 \\ 0 \text{ if } Y_i^* < 0 \end{matrix}$$

Thus, both the participation and the allocation analysis, probit and tobit respectively, have the same structural model, just different measurement models – how the latent variable Y_i^* is translated into Y_i is different (more information in tobit).

As also argued by Rosen and Wu (2004), it is difficult to find a compelling reason to use different variables for the allocation regression compared to the participation regression. This is even more so in the understanding of a single investment decision adopted in the present paper, so this analysis follows the usual practice and use the same set of the covariates in both equations.

In particular, following Atella et al. (2012), the portfolio choice of household i living in a country j can be represented as:

$$Y_{i,j} = f(H_{i,j}, S_j) \qquad (2)\ ,$$

Where i is a household and j is a country. When analyzing the participation decision (extensive margin), $Y_{i,j}$ is binary variable being equal to 1 if household holds risky assets and 0 otherwise, and in the allocation decision (intensive margin) $Y_{i,j}$ is a continuous variable bounded between 0 and 1 indicating the share of household financial portfolio held in the risky assets. The other two elements are household observables $H_{i,j,}$ and the system-wide observable characteristics S_j.

Household characteristics:

The main variable of interest is the health status. The model controls for a set of socio-economic variables found in the literature to be significant in explaining the patterns of portfolio choice. These include household size, age, gender, marital status, education, income, wealth, bequest motives, cognitive abilities and social interactions.

System-wide characteristics:

The generosity of the health care system protection may be crucial in the extent to which household's health status shapes her portfolio decision, since less protective health systems shield less against unexpected medical expenditure. Therefore, equation (1) can be rewritten as:

$$Y_{i,j} = f(HS_{i,j}, H^d_{i,j}, S_j) \qquad (3)\ ,$$

where $HS_{i,j}$ represents the household's health status, $H^d_{i,j}$ are the non-health related household characteristics (demographic and socio-economic observables) and S_j system-wide observable characteristics .

Whenever a country is characterized by the NHS, a full (or nearly full) public coverage is guaranteed, thus the individual health-related characteristics should be less (if at all) relevant in shaping households' portfolio choice.

Empirical specification:

To test the model, I follow Atella et al. (2012) and split the sample according to the dummy variable being 1 if the residence of a household is the NHS country (Sweden, Denmark, Italy, Spain) and 0 if the non-NHS country (Belgium, Austria, Netherlands, Germany, France, Switzerland, Greece). This dummy is a crude indicator of the degree to which the health care system shields from the health-related financial risks.

Therefore, the latent variable in equation (1) can be represented as:

$$Y^*_{i,j,k} = \ \Sigma_{\mathrm{j}}\beta_{0,j,k}C_j + \beta_{1,k}HS_{\mathrm{i,j,k}} + \ \Sigma_{\mathrm{n}}\beta_{n,k}H_{i,j,n,k} + \ \varepsilon_{i,j,k}$$

where i represents a household, j represents a country, and k represents the indicator whether country belongs to the group having the NHS. Φ represents the cumulative distribution function of a standard normal distribution, C_j is a vector of country dummies, capturing the country fixed effects, HS is a variable describing household's health status, H is a vector of other controls, including the demographic and socio-economic household observables *(n)*, and ε_i is the error term which is standard normally distributed.

Thus, empirical representation of equation (3) for probit is:

$$Y_{i,j,k} = \Phi(\Sigma_{\mathrm{j}}\beta_{0,j,k}C_j + \beta_{1,k}HS_{i,\mathrm{j},\mathrm{k}} + \Sigma_{\mathrm{n}}\beta_{n,k}H_{i,j,n,k}) + \varepsilon_{i,j,k} \quad (4)\ ,$$

Let $X_i'\beta = \Sigma_{\mathrm{j}}\beta_{0,j,k}C_j + \beta_{1,k}HS_{\mathrm{i},\mathrm{j},\mathrm{k}} + \Sigma_{\mathrm{n}}\beta_{n,k}H_{i,j,n,k}$, the empirical representation of equation (2) for tobit is:

$$Y_i = \Phi(\frac{X_i'\beta}{6})\ [\ X_i'\beta + 6\lambda(\alpha)\ ] + \varepsilon_i \quad (5)\ ,$$

where $\lambda(\alpha) = \frac{\phi\left(\frac{X_i'\beta}{6}\right)}{\boldsymbol{\Phi}\left(\frac{X_i'\beta}{6}\right)}$ is the inverse Mills ratio, 6 is the variance of the error term ε_i which is normally distributed.

By splitting the sample according to the health system in place, the model does not explicitly account for other differences in the country-specific institutions and environmental determinants (e.g., the differences in the depth of the stock market, different pension systems, varying degrees of the bankruptcy protection). Thus, we control for the country fixed effects. The focus of the analysis then boils down to testing the difference between the two subsamples in the sensitivity of the households' portfolio choice to their health status. The hypothesis may be formalized in the following way:

Ceteris paribus, poorer health is associated with a lower probability of holding risky assets and lower share invested in those assets, but these correlations are weaker (if any) in countries with a full-coverage protective National Health Systems – i.e., the coefficient $\beta_{1,k}$ should be less negative or non-significant in countries where *k=1*.

Both probit and tobit parameters of interest are estimated by the Maximum Likelihood, developing own estimation algorithm to address the peculiarity of the data at hand (to be discussed in the next section).

Variable selection:

The empirical analysis follows the approach and similar definition of the variables found in the related literature, with the aim of better comparability of the empirical findings.

To capture the health risk faced by the individuals, we use the self-reported health status, rather than the objective health status for several reasons. Firstly, even if the objective health measures are more reliable since less likely to be affected by the measurement error, if the people buffer the health risks by altering their portfolio, what affects this decision is how they feel (a subjective perspective), rather than how they (objectively) are. The self-reports of general health have proved to be useful indicators of an individual's health by many authors (see for example Benyamini and Idler, 1997 and Jürges, 2007). Rosen and Wu (2004) report that *"Poor self-reported health is strongly correlated with mortality even after controlling for indices of functional capacity, the presence of specific medical conditions and physician health assessments."* [9]

Following a rich body of empirical literature, the model controls for many socio-economic observables which are generally found to be highly associated with the household portfolio choice. When it comes to the demographic variables, the model includes several variables widely used throughout the literature. Age enters the regression in both linear and quadratic terms to capture the life-cicle effect – since the risk aversion and the time horizon vary with it (Bertaut and Starr-McCluer, 2002; Dohmen et al., 2011; Guiso and Paiella 2008). On the intensive margin, age may also capture a traditional investment advice – namely, a rule of thumb which negatively relates the portfolio risky share and age (Malkiel, 1999). Gender is also controlled for to capture possible gaps between male and female risk attitudes,

[9] Additionally, using the SHARE data, Atella et al. (2012) find that when included in a regression for the stockholding, their measure of the objective health status is not significant at conventional significance levels, unlike the perceived health status.

since a large set of papers find that the risk aversion is higher for women than for men (in experimental setting e.g., Holt and Laury, 2002 and Fehr-Duda et al., 2006; using field and survey data e.g., Kimball et al., 2008, Guiso and Paiella, 2008, Dohmen et al., 2011). A dummy for being married is also included in the model because agents with different marital status may differ in their perceptions of and preferences for risk (e.g., Bertocchi et al., 2011) and a dummy that indicates high educational achievement, since education is found to be associated with the portfolio choice (e.g., Vissing-Jørgensen, 2002) - the reason of which might lay in the information barriers. Additionally, the cognitive abilities may affect portfolio choice in a similar way as education and are found to have independent effect from it (Christelis et al., 2010). The model focuses on those measures of cognitive abilities that are relevant for the financial investment. These include numeracy, i.e., the ability to perform numerical operations, fluency, i.e., the ability of planning and executive function and recall, i.e., the ability to compare facts and situations at the distant points in time. Following the recent related literature, the model also controls for the social interactions that are found to affect the financial decisions (in addition to Christelis et al., 2010, see e.g., Hong et al., 2004).

To capture the household's budget constraint, the model includes the household total income and net wealth.[10] Both are defined in the form of quantiles, as a more flexible specification which enables the model to capture the nonlinear relationship with the dependent variable. This is particularly important since the transaction costs might discourage the risky assets holding only for low levels of income and wealth (Christelis et al., 2010).

Portfolio of the elderly might be different than those of younger population because the elderly face much more mortality risk, which shortens their planning horizon. The bequest motives may extend this time horizon and reduce the effect of mortality risk (Hurd, 2002), thus may be particularly important among the elderly. Therefore, the model also controls for the intention to leave a bequest.

[10] Controlling for wealth stems both from the theory of „cash on hand" as an important determinant of asset holding and the need to avoid confounding the role of other covariates with that of wealth which may happen when wealth is excluded from the regression.

As reported by Rosen and Wu (2004), "*in psychology literature some argue that an individual's subjective health evaluations can be distorted by mood*" (Schmidt et al., 1996). Thus, the model also includes a dummy variable capturing low mood, similar to Christelis et al. (2010).

1.4 Data

The data used in this paper are drawn from 2004 (Wave 1) Release 2.5.0 Survey of Health, Aging and Retirement in Europe (SHARE). The SHARE was patterned after the US Health and Retirement Survey (HRS) and the English Health and Retirement Study (ELSA). It biannually surveys the households which are representative of the population of aged 50 or more in 12 (and increasing number of) European countries – Austria, Germany, Switzerland, France, Belgium, the Netherlands, Denmark, Sweden, Spain, Italy, Greece, and Israel – resulting in 35,003 individuals (including 3,888 non-responding partners) and 19,548 households. Furthermore, the survey questionnaires are standardized across countries, allowing detailed and reliable comparisons.

The SHARE encompasses detailed information on series of different questions ranging from the basic demographic information – including household size, age, gender, marital status, education, employment – to different types of cognitive abilities, intensity of social interactions, various economic variables and finally both physical and mental health. Financial assets information covers ownership and amounts invested in different assets, varying in their riskiness.[11] Thus, the dataset is particularly suited to study the association between the health risk with the social characteristics and economic outcomes.

The Israeli observations are excluded from the dataset in this paper, since for this country not all variables relevant for the analyses were available. The analysis also excludes the households in which (at least one of) the financial respondent(s) is aged over 90 or below 50.[12] The resulting sample has 27,714 individuals and 16,549 households.[13]

[11] See Appendix A.1. for more details on economic variables.
[12] The latter case happens when there is an eligible household member over 50, therefore the household is eligible for the SHARE interview, her partner is also a financial respondent and younger than her.
[13] By including the imputed data, the dataset used in this paper is threefold larger than Atella et al. (2012).

1.4.1 The health care systems of SHARE countries

The eleven countries included in the SHARE have quite heterogeneous health care systems. In this paper they are classified according to the criteria suggested by Atella et al. (2012).[14]

The countries are divided in two groups according to whether they have a full-coverage national health service. The NHS countries include Sweden, Denmark, Italy, Spain, which, as described by Allin (2005) share a few key characteristics. They are all predominantly financed through the general taxation and grant the universal access to a uniform level of care throughout the country. Private health insurance is not particularly widespread, and if any exists it is used to purchase additional services and to avoid waiting for the service (Atella et al., 2012).[15] All other countries, including Austria, Netherlands, Belgium, Germany, France, Switzerland and Greece, are classified as the non-NHS countries. In Austria, 95% of population is covered by the mandatory health insurance, 2% by the voluntary health insurance, while the remaining 3% are not covered by any insurance. In the Netherlands, the public health care system covers only "exceptional medical expenses" (long-term care or high-cost treatments), while for all other health expenditure people must turn to the compulsory sickness funds. In Belgium, the system is based on a compulsory social health insurance, which reimburses the out-of-pocket medical expenditure depending on the nature of the service, the legal status of the provider and the status of the insured person, while sickness funds offer the complementary health insurance. In Germany, the system features three co-existing schemes, statutory, private and governmental, while only 3% is covered by governmental schemes. The French health system is also based on three main schemes general (84%), agricultural (7%) and self-employed scheme (5%), which are complemented by a voluntary private health insurance, covering 95% of the population. In Switzerland, the health care system provides universal coverage, but the service is provided through multiple private insurers in a regulated competitive market. Finally, the Greek health

[14] The authors, however, did not include Belgium in the analysis, since the data for that country were not yet fully available.
[15] The share of people who hold only national health insurance is 88.2% for the NHS countries on average, compared to 67% in the non-NHS countries.

care system is characterized by the national health care system coexisting with compulsory social insurance (held by 97% of the population) and voluntary private health insurance (8%).[16]

Comparing the countries across several indicators, Atella et al. (2012) report that in the NHS group, there is a full population coverage, medical expenditures are mostly publicly financed and the average share of out-of-pocket expenditures (OOP) is slightly lower than in non-NHS group.[17] In sum, in the NHS countries there is a higher degree of publicly guaranteed protection against health related financial risks than in the non-NHS countries.

1.4.2 Accounting for non-response

Being a large household survey, the SHARE suffers from high item non-response rate, which can substantially bias estimates and also lead to a large efficiency loss, especially with many variables entering the regression equation.

Moreover, the missingness of information in our sample is the highest for the economic variables (see Table 1), since these information are deemed sensitive by many respondents. It is essential to use all the imputed data, particularly since health information is central to the analysis and the non-response is likely to be strongly positively correlated with bad health status (Hoeymans et al., 1998). The same holds for the non-responding partners (NRPs), since ignoring them may result in overestimating the health status at the household level and in biased inference.

This paper addresses item non-response explicitly by exploiting the multiple imputations (MI) of missing data provided by the SHARE, as a way to obtain valid statistical inference in the item non-response scenario.[18] The imputations allow us to more accurately

[16] These summaries are from Atella et al. (2012), based on Allin et al. (2005).
[17] The authors discuss the challenges in using average OOP expenditures to compare the protection provided by the health care systems in different countries. Most importantly, these expenditures are endogenous (since, ceteris paribus, people will seek more health services in a system where they have to pay less out of their own pocket) and they are not uniformly recorded (what counts as OOP varies across countries).
[18] The MI are a simulation-based approach for analyzing incomplete data whose objective is not to predict missing values as close as possible to the true ones but to handle the missing data in a way resulting in valid statistical inference (Rubin, 1996). The MI replaces the missing values with the multiple simulated values to complete the data, then the standard analysis should be applied to each completed dataset, and the obtained parameter estimates adjusted for missing-data uncertainty using the "Rubin combination rules" as described in Rubin (1987).

assess the health-related concerns of a household and to obtain the share invested in stocks, thus, investigate the portfolio allocation. The SHARE imputation process yields 5 implicate datasets.[19] The bias of the standard errors of the estimates depends on the fraction of the missing data, but this bias decreases with the number of implicates (as shown by Rubin, 1987). Following Christelis et al. (2010), when assessing missingness of data, the present analysis adopts the most stringent definition of the imputed values where a value of a household level variable is considered imputed if any of its constituent parts is imputed for any household member. Thus, the incidence of missing values is particularly high for total income (63.32%) and net wealth (63.03%), since these variables are sum of many elements. The statistics on the proportion of missing data for the imputed variables (prior to the imputation) used in this paper are reported in Table 1.

1.4.3 The choice of outcome variables

To define the dependent variables, the paper adopts two definitions of stockownership: direct stockownership (holding stocks directly) and total stockownership (holding stocks directly or in mutual funds/individual retirement accounts that invest mostly in stocks).

In the allocation analysis, the paper focuses on the share in stocks held only directly following Christelis et al. (2010), since for the indirect stockholding (through the mutual funds or individual retirement accounts) there are no exact amounts reported nor the imputations provided.[20]

As emphasized by Heaton and Lucas (2000) "*An important issue in studying portfolio shares is how broadly the measure of wealth in the denominator should be defined. Different pictures can emerge if one uses financial assets, all physical assets (including homes and automobiles), or physical assets plus human capital as the relevant measure of wealth*." This paper follows most of the recent literature (e.g., Edwards, 2008 and Christelis et al., 2010), and uses gross financial assets in the denominator, therefore focusing on the allocation between different types of financial assets. Beyond being an indicator of diversification

[19] For the description of the SHARE imputation process see Christelis (2008).
[20] For the mutual funds and IRAs the financial respondents are asked only whether they invest mostly in bonds, about equally in both bonds and stocks or mostly in stocks.

between the risk categories, this measure is found by Calvet et al. (2009) to be a reasonable diversification proxy for Sharpe ratio, for which the computation requires more dissagregated data than available in the SHARE.[21] Namely, when this proxy is used in the regression on household characteristics, the authors obtain results broadly consistent with the results obtained when they use Sharpe ratio itself. Thus, the regression of determinants of share of risky assets can also provide some intuition on association of health with (under)diversification *within* the risk categories.

1.4.4 Descriptive statistics

Table 2 reports the descriptive statistics of the variables used in the empirical analysis.[22] The median household has 2 members, about every fifth household having non-responding partner. The median financial respondent is about 64 years old, married and equally likely to be male and female. Household's average perceived health-status is 3.16 on 1 (Excellent) to 5 (Poor) US scale - so something between Good and Fair.

When it comes to the cognitive abilities, the average financial respondent displays fairly good level of all three measures: numerical skills (around 3 correct answers), fluency (around 18 animals named) and memory (around 5 recalled). Around 19% of financial respondents take part in some social activity. The median household head assigns probability of 60% to leaving an inheritance of over 50,000€. A household has median annual income of slightly less than 27,000 € (mean 41,000 €) and net wealth of around 150,000€ (mean 307,400 €). It has around 10,400€ (mean 44,500€) of gross financial assets. From those having positive amount of financial assets (14,249 households), around 4% is directly invested in stocks.

[21] The SHARE dataset, as most large survey datasets, does not report holdings in the specific assets, but only in the asset classes.
[22] For more details on variables construction see Appendix A.2.

1.5 Econometric analysis and results

The analysis includes two dependent variables: a) binary variable for holding risky assets (extensive margin) b) share of funds invested in risky assets (intensive margin). The analysis computes the portfolio shares for all individuals who reported positive financial assets.[23]

In both the participation and the allocation analasys, separate models for two measures of self-reported health status are estimated – in a discrete form and in a dummy form.[24] Each regression is estimated for full sample, and then separately for NHS and non-NHS countries, obtaining coefficients by Rubin combination rules (Rubin, 1987). More specifically, the coefficients are computed as the mean of coefficients estimated on five individual implicate datasets and the standard errors are computed taking into account both within and between imputation variability of the five estimated standard errors.[25] Following the commonly used practice, the marginal effects are reported at the (weighted) means of variables (combining all 5 implicate datasets). Since both probit and tobit models are non-linear, the marginal effects are non-linear combinations of the coefficients, thus the computation of the corresponding standard errors is not straightforward. Following Christelis et al. (2010), the estimation employs the bootstrap method to obtain the standard errors.[26]

1.5.1 The extensive margin (probabilities of stockholding)

Probit regressions for participation decision are estimated for both direct stockholding and the total stockholding. The estimates of the marginal effects and the corresponding

[23] In the literature, some even exclude the households whose net financial position falls below some threshold (Heaton and Lucas, 2000, Curcuru et al., 2009). When computing the risky share, it is necessary to drop at least the households without any financial assets in order to exclude division by zero.

[24] For more details on how these variables are defined and constructed see Appendix A.2.

[25] Let $\hat{\beta}_m$ denote the vector of parameter estimates for imputation m, and M be the number of imputations, then the overall estimates equal $\hat{\beta} = \frac{1}{M}\sum_{m=1}^{M}\hat{\beta}_m$. The variances of these estimates consist of two unequally weighted parts: the within-imputation variance $WV = \frac{1}{M}\sum_{m=1}^{M}\hat{V}_m$ and the between-imputation variance $BV = \frac{1}{M-1}\sum_{m=1}^{M}\left(\hat{\beta}_m - \hat{\beta}\right)^2$, thus total variance equals $TV = WV + \frac{M+1}{M}BV$.

[26] For the details on estimation algorithm, please see Appendix A.3.

standard errors are reported in Table 3 for the direct stockholding and Table 4 for the total stockholding.

In support of our hypothesis, the two subsamples contrast substantially with respect to the association of stockholding with health status. These differences are net of the institutional differences across countries, since we control for the country fixed effects. The marginal effects on both self-perceived health measures (discrete and dummy) are found to be negative and statistically significant in the non-NHS countries and insignificant in the NHS countries, suggesting that the probability of holding risky assets decreases with worsening of the perceived health status, but only in the countries where the health-related financial risks are not mediated by the highly-protective NHS. The marginal effects are somewhat more precisely estimated for the total stockholding, than for the direct stockholding, and in the former regression in the non-NHS countries are the magnitude of -0.015 for the discrete, and -0.019 for the dummy measure of the health status and significant at 1% significance level. Hence, lower health status has no effect on the propensity to hold stocks in the NHS countries, whereas this effect is negative and economically significant in the non-NHS countries - one standard deviation (0.9) decreases the probability of holding the risky assets directly by 0.9 x (-0.009) = 0.8 percentage points and directly or indirectly by 0.9 x (-0.015) = 1.35 percentage points. The effect of the health status dummy going from 0 to 1 is associated with an increase in the probability of owing risky assets of 1.4 percent for the direct stockholding and 1.9 percent for the total stockholding.

Consistently, the results show that the marginal effect of the probability of leaving a bequest is significant for the full sample, but when splitting the sample, becomes larger in magnitude and significant in the non-NHS countries, while insignificant in the NHS countries. As health care is provided not only through the formal insurance contracts, but also through the informal (family) networks, the planned bequests may informally hedge through the intergenerational care arrangements (Bernheim et al., 1985). Namely, the parents may be able to hedge the health-related financial risks by bargaining care from their children through the promised inheritance, which reduces household's overall exposure to the background risk and, thus, encourages investment in the risky assets. Since in the non-NHS countries the households are not shielded from OOP medical expenditure risk by the

protective, publicly organized health system, the informal care arrangements might be particularly important for those households.[27] The importance of the bequest motives as a hedge against the health-related financial risks might be different for singles and couples, since a partner can act as a hedge himself. On one hand, the individuals may be more likely to bargain care from their children when having no partner to rely on in case of falling ill. On the other hand, the children might be more likely to accept such financial responsibility if their parents are in a couple, since the children anticipate that the parents will rely on each other in case of need (thus they foresee lower participation in their parents' medical expenditure). The results show no clear empirical support for either interpretation.[28]

In both Table 3 and 4, standard control variables display the expected signs. The probability of owning the risky assets increases with total income and net wealth in a full sample and both subsamples, and, as expected, this relationship is not linear. The marginal effects of household size and age are not statistically significant in either sample. Gender gap in inclination towards investing in the risky assets is confirmed, having males more prone to such investments than females. The marital status dummy also displays the expected positive sign, but the effect is not precisely estimated. The marginal effects of having high education is found to be positive and significant in the full sample, as expected, but in a split sample regressions it is significant only in the non-NHS countries. A likely reason is that these countries feature low transparency of the financial system on average, and therefore higher education helps to reduce information costs more than in the NHS countries. Moreover, two group of countries display high difference in average education levels.[29] In line with the findings of Christelis et al. (2010), in a full sample all three measures of cognitive abilities and social activities display positive association with the stockholding.

[27] When estimating regressions for the non-NHS countries without the bequest motives among the covariates, the marginal effect of health status dummy for being sick increases by 5-6% in magnitude, thus providing further support to this hypothesis.

[28] When the models are estimated for singles and couples separately, controlling also for number of children, marginal effect of bequest is positive and significant for couples and non-significant for singles, which would support the latter interpretation. However, the marginal effect of self-reported health status also shows up as non-significant for singles (as found in Edwards, 2008 who uses the US data), thus the results are not convincing of bequests hedging singles different than couples against the health-related financial risks.

[29] Median years of education are 12 in non-NHS countries, and 6 in NHS countries, with dummy for the high education having the mean of 0.72 an 0.36 respectively.

1.5.2 The intensive margin (share of risky assets)

As clarified in section 1.4.3., the tobit regressions for allocation among different types of financial assets are estimated for the direct stockholding only. The marginal effects and the corresponding standard errors are reported in Table 5. The results are qualitatively similar to those in the previous section.

The two subsamples contrast substantially with respect to the health variable and the measure of the bequest motives in their portfolio association with allocation. The association of the portfolio allocation with both measures of self-perceived health measures (discrete and dummy) is found to be negative and significant in the non-NHS countries and insignificant in the NHS countries, suggesting that lower perceived health status is associated with a decrease in the share of funds directly invested in stocks, but the effect is present only in the countries where health-related financial risks are not mediated by the NHS. The disparity of importance of bequest motives, and thus the intergenerational care arrangements, between two subsamples is confirmed, thus showing that the informal care arrangements might play an important role in shaping the portfolio allocation.

The marginal effects of the control variables go in the expected direction. The results show that share invested in risky assets decreases with total income, but also with net wealth, as an evidence of decreasing relative risk aversion (DRRA).[30] Coefficients on household size, age and marital status are again not statistically significant in either sample. The gender gap evidence is also confirmed, and education effect displays the disparity between two subsamples also in allocation regression. Unlike Christelis et al. (2010), the present analysis finds evidence of the cognitive abilities affecting also the intensive margin of household portfolio choice. This seems an intuitive result, since it is likely that the individuals with better cognitive abilities are better able to understand and compare different asset classes on a risk-adjusted basis. As expected, among three measures of cognitive abilities, numeracy matters the most for the portfolio choice. Sociability is again positive but not as precisely estimated as in probit. It seems reasonable to argue that social learning increases the

[30] DRRA is the result also obtained in e.g., Calvet et al. (2009).

probability that individuals become aware about existing assets (Guiso and Jappelli, 2005), but there is no particular reason why sociability would affect their effective risk aversion.

1.5.3 Robustness check – the stock market non-participation

Following Bilias et al. (2010), in analysing the participation in risky assets by probit model in section 1.5.1, this robustness check restricts the sample to the households holding positive amount in financial assets, *„not to equate the stock market non-participation with the decision to hold no assets at all (or the inability to do so)".* Thus, probit is re-estimated excluding the households with zero financial assets, so using the same sample used in the tobit analysis. Table 6 and 7 report the results for direct and total stockholding respectively. The results are robust to this alternative definition of non-participation.

1.6 Conclusion

This paper uses data drawn from the SHARE sample covering the elderly population in Europe to investigate whether the health care systems play a role in shaping the household portfolio choice by providing varying degrees of protection toward the health-related financial risks. Specifically, we test whether a presence of the National Health System reduces the sensitivity of the households' portfolio choice to their health status concerns. Using the multiple imputation analysis to mitigate the potential bias arising from high item non-response in the SHARE, the results suggest that, by increasing household's exposure to health-related financial risk, less protective health care systems indeed drive sick households towards safer portfolios. This is documented by both probit analysis of holding the risky assets and tobit analysis of portfolio share invested in those assets. There is a suggestive evidence that the informal care arrangements in the form of bequests may (partially) compensate for the uncertainty arising from the lack of a full-coverage national health system and, thus, (partially) offset the associated effect of the health risk on the portfolio choice.

Several other issues remain open. First is related to the measurement consistency across countries, namely, whether the presented evidence holds true if one uses "vignette" sample (to account for the potential bias in using the subjective health evaluations). Second, further examination of how and to which extent the informal care arrangements affect the association of the health status and the portfolio choice and whether the design of the inheritance law may play a role in this context. The question seems particularly important because the family arrangements can compensate for the lack of a (full) public coverage of health risks and, thus, offset the associated effect of health risk on the portfolio choice. This question requires additional data beyond the one provided by the SHARE and is left to future research.

1.7 References

Alan, S., Atalay, K., & Crossley, T. F. (2008). The Adequacy of Retirement Savings: Subjective Survey Reports by Retired Canadians. *Canadian Public Policy, 34*(s1), 95-118.

Allin, S., Bankauskaite, V., Dubois, H., Figueras, J., Golna, C., Grosse-Tebbe, S., . . . Thomson, S. (2005). Snapshots of health systems. In S. F. Grosse-Tebbe. European Observatory on Health Systems and Policies.

Atella, V., Brunetti, M., & Nicole, M. (2012). Household portfolio choices, health status and health care systems: A cross-country analysis based on SHARE. *Journal of Banking and Finance, 36(5),* 1320-1335.

Benyamini, Y., & Idler, E. L. (1997). Self-related health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior, 38,* 21–37.

Bernheim, D. B., Shleifer, A., & Summers, L. H. (1985). The Strategic Bequest Motive. *Journal of Political Economy, 93,* 1045–1076.

Bertaut, C. C., & Haliassos, M. (1995). Why Do So Few Hold Stocks? *Economic Journal, Royal Economic Society, 105*(432), 1110-1129.

Bertaut, C. C., & Starr-McCluer, M. (2002). Household portfolios in the United States. In L. H. Guiso, *Household Portfolios* (pp. 181–218). Cambridge, MA: MIT Press.

Bertocchi, G., Brunetti, M., & Costanza, C. (2011). Marriage and other risky assets: A portfolio approach. *Journal of Banking & Finance, 35*(11), 2902–2915.

Bilias, Y., Georgarakos, D., & Haliassos, M. (2010). Portfolio Inertia and Stock Market Fluctuations. *Journal of Money, Credit and Banking, 42*(4), 715-742.

Brunetti, M., & Torricelli, C. (2010). Population age structure and household portfolio choices in Italy. *European Journal of Finance, 16*(6), 481-502.

Calvet, L. E., Campbell, J. Y., & Sodini, P. (2009). Fight or Flight? Portfolio Rebalancing by Individual Investors. *Quarterly Journal of Economics, 124*(1), 301-348.

Christelis, D. (2008). Item non-response in SHARE Wave2. In A. B. Borsch-Supan, *First Results from the Survey on Health, Aging and Retirement in Europe (2004–2007): Starting the Longitudinal Dimension.* Mannheim: Mannheim Research Institute for the Economics of Aging.

Christelis, D. (2011). Imputation of Missing Data in Waves 1 and 2 of SHARE. *CSEF Working Papers 278*.

Christelis, D., Jappelli, T., & Padula, M. (2005). Wealth and portfolio composition. In A. B. Borsch-Supan, *Health, Aging and Retirement in Europe: First Results from the Survey of Health, Aging and Retirement in Europe.* Mannheim: Mannheim Research Institute for the Economics of Aging.

Christelis, D., Jappelli, T., & Padula, M. (2010). Cognitive abilities and portfolio choice. *European Economic Review, 54*(1), 18-38.

Curcuru, S., Heaton, J., Lucas, D., & Moore, D. (2009). Heterogeneity and Portfolio Choice: Theory and Evidence. In e. Y.-S. Hansen, *Handbook of Financial Econometrics.* Amsterdam: North-Holland.

Dohmen, T. J., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally-Validated Survey. *Journal of the European Economic Association, 9*(3), 522-550.

Edwards, R. D. (2008). Health Risk and Portfolio Choice. *Journal of Business & Economic Statistics, American Statistical Association, 26*, 472-485.

Eeckhoudt, L., & Kimball, M. (1992). Background risk, prudence and the demand for insurance. In G. Dionne, *Contributions to Insurance Economics* (pp. 239-254). London: Kluwer Academic Press.

Elmendorf, D. W., & Kimball, M. S. (2000). Taxation of Labor Income and the Demand for Risky Assets. *International Economic Review, 41*(3), 801-833.

Fehr-Duda, H., de Gennaro, M., & Schubert, R. (2006). Genders, Financial Risk, and Probability Weights. *Theory and Decision, 60*(2-3), 283-313.

Goldman, D. P., & Maestas, N. A. (forthcoming). Medical expenditure risk and household portfolio choice. *Journal of Applied Econometrics*.

Gollier, C. (2002). What Does Classical Theory Have to Say about Household Portfolios? In L. Guiso, T. Jappelli, & M. Haliassos, *Household Portfolios* (pp. 27–54). Cambridge, MA: MIT Press.

Gollier, C., & Pratt, J. W. (1996). Weak Proper Risk Aversion and the Tempering Effect of Background Risk. *Econometrica, 64*, 1109–1123.

Guiso, L., & Jappelli, T. (2005). Awareness and Stock Market Participation. *Review of Finance, 9*(4), 537-567.

Guiso, L., & Paiella, M. (2008). Risk Aversion, Wealth, and Background Risk. *Journal of the European Economic Association, 6*(6), 1109-1150.

Guiso, L., & Sodini, P. (2012). Household Finance: An Emerging Field. *CEPR Discussion Papers 8934*.

Guiso, L., Haliassos, M., & Jappelli, T. (2002). *Household Portfolios.* Cambridge, MA.: MIT Press.

Guiso, L., Jappelli, T., & Terlizzesse, D. (1996). Income Risk, Borrowing Constraints and Portfolio Choice. *American Economic Review, 86*, 158-172.

Harel, O. (2009). The estimation of R2 and adjusted R2 in incomplete data sets using multiple imputation. *Journal of Applied Statistics, 36*(10), 1109-1118.

Heaton, J., & Lucas, D. (2000). Portfolio choice and asset prices: the importance of entrepreneurial risk. *Journal of Finance, 55*, 1163–1198.

Himmelstein, D. U., Warren, E., Thorne, D., & Woolhandler, S. (2005). Illness And Injury As Contributors To Bankruptcy. *Health Affairs, 24*, w63-w73.

Hoeymans, N., Feskens, E. J., Van Den Bos, G. A., & Kromhout, D. (1998). Non-response bias in a study of cardiovascular diseases, functional status and self-rated health among elderly men. *Age and Ageing, 27*, 35-40.

Holt, C. A., & Laury, S. K. (2002). Risk Aversion and Incentive Effects. *American Economic Review, 92,*(5), 1644-1655.

Hong, H., Kubik, J. D., & Stein, J. C. (2004). Social interaction and stock market participation. *Journal of Finance, 59*(1), 137-163.

Hurd, M. D. (2002). In L. Guiso, T. Jappelli, & M. Haliassos, *Household Portfolios* (pp. 431-472). Cambridge, MA: MIT Press.

Jürges, H. (2007). True health vs. response styles: Exploring cross-country differences in self-reported health. *Health Economics, 16*(2), 163-178.

Kimball, M. S. (1993). Standard Risk Aversion. *Econometrica, 61*(3), 589-611.

Kimball, M. S., Sahm, C. R., & Shapiro, M. D. (2008). Imputing Risk Tolerance from Survey Responses. *Journal of the American Statistical Association, 103*(483), 1028-1038.

Little, R. J., & Rubin, D. B. (2002). *Statistical Analysis with Missing Data.* New York: John Wiley & Sons.

Mahoney, N. (forthcoming). Bankruptcy as Implicit Health Insurance. *American Economic Review*.

Malkiel, B. G. (1999). *A Random Walk Down Wall Street: Including a Life-Cycle Guide to Personal Investing* (7 ed.). New York: Norton.

Poterba, J. M., & Samwick, A. (2003). Taxation and household portfolio composition: U.S. evidence from the 1980's and 1990's. *Journal of Public Economics, 87,* 5–38.

Pratt, J. W., & Zeckhauser, R. J. (1987). Proper Risk Aversion. *Econometrica, 55*(1), 143-154.

Rosen, H. S., & Wu, S. (2004). Portfolio choice and health status. *Journal of Financial Economics, 72*, 457–484.

Rubin, D. B. (1987). *Multiple Imputation for Nonresponse in Surveys.* New York: Wiley.

Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association, 91,* 473-489.

Schmidt, N. B., Telch, M. J., & Joiner, T. E. (1996). Factors influencing health perceptions in patients with panic disorder. *Comprehensive Psychiatry 37*, 253–260.

Train, K. E. (2003). *Discrete Choice Methods with Simulation.* Cambridge: Cambridge University Press.

Vissing-Jørgensen, A. (2002). Towards an Explanation of Household Portfolio Choice Heterogeneity: Nonfinancial Income and Participation Cost Structures. *NBER, Working Paper 8884.*

Xu, K., Evans, D. B., Zeramdini, R., Klavus, J., & Murray, C. J. (2003). Household Catastrophic Health Expenditure: A Multicountry Analysis. *Lancet 362, no. 9378*, 111–117 CrossRefMedline.

Yogo, M. (revised January 2009). Portfolio Choice in Retirement: Health Risk and the Demand for Annuities, Housing and Risky Assets. *Working Papers, Center for Retirement Research at Boston College*, wp2009-3.

1.8 Tables

Table 1. Prevalence of missing values of the imputed variables

	Missing	Total	Percent Missing
Amount held in stocks directly	2,457	16,549	14.85
Gross financial assets	8,717	16,549	52.67
Share invested in risky assets	8,497	14,249	59.63
Total income	10,479	16,549	63.32
Net worth	10,431	16,549	63.03
Perceived Health Status	3,324	16,549	20.09

Table 2. Descriptive statistics

VARIABLES	MEAN	MEDIAN	SD	MIN	MAX	OBS
household size	2.13	2	1.04	1	9	16549
household has a non-responding partner	0.21		0.40	0	1	16549
age	65.20	64.42	9.75	50.00	89.92	16549
male	0.50		0.50	0	1	16549
married	0.64		0.48	0	1	16549
years of education	9.86	10.5	4.84	0	21	16549
PHS (discrete, US scale: from 1 "Excellent" to 5	3.16	3	0.90	1	5	16549
PHS (dummy, 1 if less than good health)	0.44		0.50	0	1	16549
low mood	0.07		0.26	0	1	16549
numeracy	3.28	3	1.13	1	5	16549
fluency	18.15	17.5	7.21	0	90	16549
recall	4.68	5	1.78	0	10	16549
sociability	0.19		0.39	0	1	16549
Probability of leaving inheritance >50.000	53.70	60	43.94	0	100	16549
total income	4.10	2.66	4.83	0	90.96	16549
net worth	30.74	14.96	89.92	-224.88	2918.08	16549
gross financial assets	4.45	1.04	14.08	0	626.65	16549
Dummy for directly investing in risky assets	0.14		0.34	0	1	16549
Dummy for indirectly investing in risky assets	0.05		0.22	0	1	16549
Dummy for investing in risky assets (directly or	0.16		0.37	0	1	16549
Amount directly invested in risky assets	0.48	0	4.47	0	407.39	16549
Share directly invested in risky assets	0.04	0	0.14	0	1	14249
NHS_dummy	0.36			0	1	16549
Austria	0.03			0	1	16549
Germany	0.28			0	1	16549
Sweden	0.03			0	1	16549
the Netherlands	0.05			0	1	16549
Spain	0.12			0	1	16549
Italy	0.19			0	1	16549
France	0.19			0	1	16549
Denmark	0.02			0	1	16549
Greece	0.04			0	1	16549
Switzerland	0.02			0	1	16549
Belgium	0.03			0	1	16549

All variables are reported at the household level. Statistics are computed using the sample weights.
All monetary amounts are PPP-adjusted and in 10.000 of Euros.

Table 3. Participation decision/direct stockholding – probit estimates

VARIABLES	Probit direct stockholding discrete PHS			Probit direct stockholding dummy PHS		
	Overall	Countries without NHS	Countries with NHS	Overall	Countries without NHS	Countries with NHS
HS discrete	-0.0052*	-0.0094**	0.0026			
	(0.003)	(0.0045)	(0.0031)			
HS dummy *				-0.0079	-0.0137**	0.004
				(0.0049)	(0.0067)	(0.0048)
low mood *	-0.0368**	-0.0411	-0.035*	-0.0398**	-0.0453	-0.0323*
	(0.0172)	(0.0256)	(0.0178)	(0.0188)	(0.029)	(0.017)
Total income q2*	0.0432***	0.0375*	0.0468**	0.0432***	0.0375*	0.0468**
	(0.0159)	(0.0194)	(0.0179)	(0.0159)	(0.0194)	(0.0207)
Total income q3*	0.0993***	0.1006***	0.0813***	0.0993***	0.1006***	0.0813***
	(0.0151)	(0.019)	(0.0181)	(0.0151)	(0.019)	(0.022)
Total income q4*	0.1404***	0.1339***	0.13***	0.1404***	0.1339***	0.1301***
	(0.0148)	(0.0179)	(0.0225)	(0.0148)	(0.0179)	0.0285
Net worth q2*	0.0946***	0.0998***	0.0657***	0.0946***	0.0998***	(0.0657***)
	(0.0161)	(0.0193)	(0.0157)	(0.0161)	(0.0193)	0.0192
Net worth q3*	0.1362***	0.1259***	0.134***	0.1362***	0.1259***	0.1344***
	(0.0153)	(0.0182)	(0.0216)	(0.0153)	(0.0182)	(0.0268)
Net worth q4*	0.2177***	0.193***	0.228***	0.2177***	0.193***	0.2276***
	(0.013)	(0.0199)	(0.0212)	(0.013)	(0.0199)	(0.0228)
Household size	-0.0032	-0.0035	-0.0018	-0.0037	-0.0043	-0.0017
	(0.0035)	(0.0049)	(0.0035)	(0.004)	(0.0061)	(0.0033)
Age	0.0029	0.0012	0.0054	0.0033	0.0015	0.0048
	(0.004)	(0.006)	(0.0041)	(0.0046)	(0.0076)	(0.0043)
Age squared	-0.00002	-0.00001	-0.00004	-0.00003	-0.00001	-0.00001
	(0.00003)	(0.00005)	(0.00003)	(0.00004)	(0.00006)	(0.00006)
Male *	0.0412***	0.0463***	0.0276***	0.044***	0.0499***	0.0257**
	(0.008)	(0.0103)	(0.0102)	(0.0087)	(0.0113)	(0.0105)
Married *	0.0145	0.0174	0.0068	0.0155	0.0189	0.0063
	(0.0097)	(0.0132)	(0.0133)	(0.0104)	(0.0145)	(0.0129)
Higher Education *	0.0393***	0.0571***	0.0208	0.0421***	0.0619***	0.0193
	(0.0087)	(0.0129)	(0.0123)	(0.0093)	(0.0142)	(0.012)
Numeracy	0.0159***	0.0207***	0.0072**	0.0182***	0.0254***	0.0065**
	(0.0028)	(0.0042)	(0.003)	(0.0034)	(0.0056)	(0.003)
Fluency	0.0012***	0.0014**	0.0008	0.0014***	0.0017***	0.0007
	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0007)	(0.0005)
Recall	0.0041**	0.0043*	0.0038*	0.0047**	0.0053*	0.0034*
	(0.0018)	(0.0026)	(0.0021)	(0.0021)	(0.0032)	(0.002)
Sociability *	0.0223**	0.0212*	0.028**	0.0237**	0.0227*	0.0261**
	(0.0092)	(0.0115)	(0.0117)	(0.0096)	(0.0122)	(0.0114)
Inheritance	0.0002***	0.0003***	0.00004	0.0002**	0.0004***	0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	16549	10621	5928	16549	10621	5928
R2	0.24	0.22	0.30	0.24	0.22	0.30

Note: Marginal effects evaluated at the weighted means. *** p<0.01, ** p<0.05, * p<0.1
Standard errors are reported in parentheses, calculated using 200 bootstrap replications. The R^2 measure is computed as in Harel, O. (2009.) The results are a combination of those of separate regressions for each implicate dataset, using the multiple imputation methodology of Rubin (1987). Country fixed effects included, but not reported. Categorical variables are marked with an asterix. Monetary amounts are PPP-adjusted and in 10.000 of Euros.

Table 4. Participation decision/total stockholding – probit estimates

VARIABLES	Probit total stockholding discrete PHS			Probit total stockholding dummy PHS		
	Overall	Countries without NHS	Countries with NHS	Overall	Countries without NHS	Countries with NHS
HS discrete	-0.0082**	-0.015***	0.0036			
	(0.0036)	(0.005)	(0.0041)			
HS dummy *				-0.0112**	-0.0189***	0.0053
				(0.005)	(0.0062)	(0.0055)
low mood *	-0.0275	-0.0272	-0.0295	-0.0294	-0.0289	-0.0268
	(0.0196)	(0.0291)	(0.0199)	(0.0211)	(0.0318)	(0.0179)
Total income q2*	0.0503***	0.0392**	0.0542***	0.0503***	0.0392**	0.0542***
	(0.0151)	(0.0182)	(0.021)	(0.0151)	(0.0182)	(0.021)
Total income q3*	0.101***	0.0872***	0.0988***	0.101***	0.0872***	0.0988***
	(0.0127)	(0.0167)	(0.0221)	(0.0127)	(0.0167)	(0.0221)
Total income q4*	0.1378***	0.1147***	0.1561***	0.1378***	0.1147***	0.1561***
	(0.0121)	(0.0162)	(0.0271)	(0.0121)	(0.0162)	(0.0271)
Net worth q2*	0.0855***	0.087***	0.0587***	0.0855***	0.087***	0.0587***
	(0.0154)	(0.0165)	(0.0193)	(0.0154)	(0.0165)	(0.0193)
Net worth q3*	0.1197***	0.1052***	0.1222***	0.1197***	0.1052***	0.1222***
	(0.0143)	(0.0165)	(0.0267)	(0.0143)	(0.0165)	(0.0267)
Net worth q4*	0.1861***	0.1481***	0.223***	0.1861***	0.1481***	0.223***
	(0.0147)	(0.0232)	(0.0231)	(0.0147)	(0.0232)	(0.0231)
Household size	-0.0037	-0.0023	-0.0041	-0.0044	-0.0029	-0.0035
	(0.0041)	(0.0059)	(0.004)	(0.0047)	(0.0075)	(0.0034)
Age	0.0072	0.0062	0.0073	0.0084	0.0079	0.0063
	(0.0047)	(0.0067)	(0.0051)	(0.0056)	(0.0086)	(0.0049)
Age squared	-0.0001	0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.00004)	(0.0001)	(0.00004)	(0.00004)	(0.0001)	(0.00004)
Male *	0.0477***	0.0526***	0.032***	0.0503***	0.0547***	0.0294***
	(0.0082)	(0.0105)	(0.0109)	(0.0089)	(0.0109)	(0.0107)
Married *	0.0125	0.0149	0.0045	0.0132	0.0156	0.0041
	(0.0105)	(0.0133)	(0.0151)	(0.0111)	(0.014)	(0.0139)
Higher Education *	0.0365***	0.0491***	0.017	0.0387***	0.0515***	0.0156
	(0.0093)	(0.0136)	(0.013)	(0.0098)	(0.0144)	(0.0119)
Numeracy	0.019***	0.0223***	0.0105***	0.0222***	0.0282***	0.0091***
	(0.0034)	(0.0045)	(0.0036)	(0.0041)	(0.006)	(0.0034)
Fluency	0.0018***	0.002***	0.001*	0.0021***	0.0025***	0.0009*
	(0.0004)	(0.0006)	(0.0006)	(0.0005)	(0.0008)	(0.0005)
Recall	0.0058***	0.0068**	0.0036	0.0068***	0.0086**	0.0031
	(0.0021)	(0.0028)	(0.0023)	(0.0025)	(0.0036)	(0.002)
Sociability *	0.0179*	0.0142	0.031**	0.0188*	0.0147	0.0286**
	(0.0095)	(0.012)	(0.0134)	(0.0099)	(0.0123)	(0.0124)
Inheritance	0.0003***	0.0004***	0.0001	0.0004***	0.0005***	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	16549	10621	5928	16549	10621	5928
R2	0.26	0.22	0.35	0.26	0.22	0.35

Note: Marginal effects evaluated at the weighted means. *** p<0.01, ** p<0.05, * p<0.1
Standard errors are reported in parentheses, calculated using 200 bootstrap replications. The R^2 measure is computed as in Harel, O. (2009.) The results are a combination of those of separate regressions for each implicate dataset, using the multiple imputation methodology of Rubin (1987). Country fixed effects included, but not reported. Categorical variables are marked with an asterix. Monetary amounts are PPP-adjusted and in 10.000 of Euros.

Table 5. Allocation decision/direct stockholding – tobit estimates

VARIABLES	Tobit direct stockholding discrete PHS			Tobit direct stockholding dummy PHS		
	Overall	Countries without NHS	Countries with NHS	Overall	Countries without NHS	Countries with NHS
HS discrete	-0.0026	-0.005***	0.0026			
	(0.0016)	(0.0016)	(0.0021)			
HS dummy *				-0.0078	-0.0064**	0.0002
				(0.005)	(0.003)	(0.0131)
low mood *	-0.038**	-0.0436	-0.0411	-0.0402**	-0.0459	-0.0375
	(0.0177)	(0.0281)	(0.0278)	(0.0188)	(0.0282)	(0.0288)
Total income q2*	0.0391***	0.0324*	0.0488**	0.0391***	0.0316*	0.0519***
	(0.0146)	(0.0178)	(0.0198)	(0.0146)	(0.0177)	(0.0197)
Total income q3*	0.0939***	0.0919***	0.0881***	0.0939***	0.0945***	0.0925***
	(0.0156)	(0.0184)	(0.0208)	(0.0156)	(0.0201)	(0.0211)
Total income q4*	0.123***	0.115***	0.122***	0.1226***	0.1209***	0.1258***
	(0.0155)	(0.0162)	(0.0275)	(0.0155)	(0.0182)	(0.0253)
Net worth q2*	0.0808***	0.0863***	0.0479**	0.0808***	0.0876***	0.0501**
	(0.0167)	(0.0201)	(0.0192)	(0.0167)	(0.0215)	(0.0199)
Net worth q3*	0.115***	0.106***	0.105***	0.1147***	0.1093***	0.1095***
	(0.0167)	(0.0188)	(0.0247)	(0.0167)	(0.0199)	(0.024)
Net worth q4*	0.186***	0.166***	0.173***	0.1859***	0.1887***	0.1744***
	(0.0154)	(0.0172)	(0.023)	(0.0154)	(0.0138)	(0.0218)
Household size	-0.0013	-0.0012	-0.0012	-0.0015	-0.0011	-0.0012
	(0.002)	(0.0019)	(0.0028)	(0.0023)	(0.0019)	(0.0028)
Age	0.0019	0.0014	0.0034	0.0022	0.0013	0.0035
	(0.0025)	(0.0025)	(0.0028)	(0.0028)	(0.0025)	(0.0027)
Age squared	-.0000141	-0.00001	-0.00002	-0.00002	-0.000009	-0.00003
	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)
Male *	0.0354***	0.0366***	0.0302**	0.037***	0.0371***	0.03**
	(0.0094)	(0.0105)	(0.0142)	(0.01)	(0.0105)	(0.0142)
Married *	0.0084	0.0133	-0.0031	0.0088	0.0133	-0.0019
	(0.0131)	(0.0142)	(0.018)	(0.0136)	(0.0143)	(0.0177)
Higher Education *	0.035***	0.058***	0.013	0.0367***	0.0588***	0.0126
	(0.0104)	(0.014)	(0.0138)	(0.011)	(0.014)	(0.0139)
Numeracy	0.008***	0.0096***	0.0049*	0.009***	0.0096***	0.0048*
	(0.0015)	(0.0015)	(0.0029)	(0.0017)	(0.0015)	(0.0029)
Fluency	0.0006***	0.0008**	0.0001	0.0007***	0.0008**	0.0001
	(0.0002)	(0.0003)	(0.0004)	(0.0002)	(0.0003)	(0.0004)
Recall	0.002**	0.0017	0.0033**	0.0023**	0.0018	0.0033**
	(0.0008)	(0.0013)	(0.0015)	(0.001)	(0.0014)	(0.0015)
Sociability *	0.0164*	0.0168	0.0182	0.0171*	0.0173	0.0169
	(0.0093)	(0.0125)	(0.012)	(0.0097)	(0.0126)	(0.0118)
Inheritance	0.0001*	0.0001***	-0.000003	0.0001*	0.0001***	-0.000005
	(0.00004)	(0.00004)	(0.0001)	(0.0001)	(0.00004)	(0.0001)
Observations	14249	9313	4936	9313	9313	4936
R2	0.19	0.25	0.09	0.19	0.24	0.09

Note: Marginal effects evaluated at the weighted means. *** p<0.01, ** p<0.05, * p<0.1
Standard errors are reported in parentheses, calculated using 50 bootstrap replications. The R^2 measure is computed as in Harel, O. (2009.).

Table 6. Participation decision/direct stockholding: sample restricted to the households with positive amount invested in financial assets

VARIABLES	Probit direct stockholding discrete PHS			Probit direct stockholding dummy PHS		
	Overall	Countries without NHS	Countries with NHS	Overall	Countries without NHS	Countries with NHS
HS discrete	-0.0062*	-0.01*	0.0018			
	(0.0037)	(0.0053)	(0.0041)			
HS dummy *				-0.0093	-0.0138*	0.0027
				(0.0058)	(0.0077)	(0.0051)
low mood *	-0.0357**	-0.0399	-0.0369	-0.0405**	-0.0435*	-0.0354*
	(0.0172)	(0.0245)	(0.0243)	(0.0203)	(0.0264)	(0.0189)
Total income q2*	0.0381**	0.0323	0.0469**	0.039***	0.0323	0.0469**
	(0.015)	(0.0212)	(0.0208)	(0.0149)	(0.0212)	(0.0205)
Total income q3*	0.0918***	0.0927***	0.0811***	0.0917***	0.0927***	0.0811***
	(0.0138)	(0.0234)	(0.0223)	(0.013)	(0.0234)	(0.0229)
Total income q4*	0.1335***	0.1279***	0.13***	0.1304***	0.1279***	0.1295***
	(0.0131)	(0.0215)	(0.026)	(0.0119)	(0.0215)	(0.0249)
Net worth q2*	0.0925***	0.0973***	0.064***	0.0924***	0.0973***	0.064**
	(0.0171)	(0.0229)	(0.0222)	(0.0168)	(0.0229)	(0.0265)
Net worth q3*	0.1299***	0.1219***	0.128***	0.1271***	0.1219***	0.1278***
	(0.0161)	(0.0189)	(0.0273)	(0.0153)	(0.0189)	(0.026)
Net worth q4*	0.206***	0.1841***	0.216***	0.1877***	0.1841***	0.2158***
	(0.0157)	(0.0234)	(0.0246)	(0.0175)	(0.0234)	(0.0256)
Household size	-0.0033	-0.0036	-0.0018	-0.0043	-0.0043	-0.0017
	(0.004)	(0.0049)	(0.0048)	(0.0053)	(0.0061)	(0.0052)
Age	0.0039	0.0021	0.0076	0.0052	0.0026	0.0072
	(0.0031)	(0.0061)	(0.0064)	(0.0041)	(0.0073)	(0.0061)
Age squared	-0.00003	-0.00002	-0.00006	-0.00004	-0.00002	-0.00005
	(0.00002)	(0.00005)	(0.00005)	(0.00003)	(0.00006)	(0.00005)
Male *	0.0428***	0.0471***	0.0308**	0.0473***	0.0502***	0.0297**
	(0.008)	(0.0114)	(0.0134)	(0.0089)	(0.0122)	(0.0144)
Married *	0.0135	0.0165	0.0053	0.015	0.0176	0.0051
	(0.0115)	(0.0149)	(0.0159)	(0.013)	(0.016)	(0.0169)
Higher Education *	0.0389***	0.0579***	0.0192	0.0431***	0.0621***	0.0186
	(0.0097)	(0.0148)	(0.0141)	(0.0107)	(0.0163)	(0.0146)
Numeracy	0.0165***	0.0217***	0.0069	0.0217***	0.0263***	0.0064
	(0.0033)	(0.0039)	(0.0045)	(0.0044)	(0.0052)	(0.0043)
Fluency	0.0013**	0.0015***	0.0005	0.0017**	0.0019***	0.0004
	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0007)	(0.0005)
Recall	0.0048**	0.0045	0.0061*	0.0063**	0.0054	0.0057*
	(0.0023)	(0.0032)	(0.0032)	(0.003)	(0.004)	(0.003)
Sociability *	0.0208***	0.0197*	0.0271*	0.0228***	0.0209*	0.0262*
	(0.0081)	(0.0106)	(0.0141)	(0.0086)	(0.0112)	(0.0147)
Inheritance	0.0002***	0.0003**	0.00006	0.0003**	0.0003**	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	14249	9313	4936	14249	9313	4936
R2	0.22	0.21	0.26	0.22	0.21	0.26

Note: Marginal effects evaluated at the weighted means. *** p<0.01, ** p<0.05, * p<0.1
Standard errors are reported in parentheses, calculated using 50 bootstrap replications. The R^2 measure is computed as in Harel, O. (2009.)

Table 7. Participation decision/total stockholding: sample restricted to the households with positive amount invested in financial assets

VARIABLES	Probit total stockholding discrete PHS			Probit total stockholding dummy PHS		
	Overall	Countries without NHS	Countries with NHS	Overall	Countries without NHS	Countries with NHS
HS discrete	-0.011**	-0.0159***	0.003			
	(0.0045)	(0.0055)	(0.0043)			
HS dummy *				-0.0122**	-0.0189***	0.0042
				(0.0051)	(0.0065)	(0.0057)
low mood *	-0.0249	-0.0235	-0.0297	-0.0251	-0.0244	-0.0281
	(0.0223)	(0.0282)	(0.0269)	(0.0224)	(0.0298)	(0.0246)
Total income q2*	0.043***	0.0329*	0.0547***	0.0439***	0.0329*	0.0547***
	(0.0124)	(0.0184)	(0.0204)	(0.0131)	(0.0184)	(0.0204)
Total income q3*	0.0867***	0.078***	0.0992***	0.0911***	0.078***	0.0992***
	(0.0118)	(0.0195)	(0.0236)	(0.0128)	(0.0195)	(0.0236)
Total income q4*	0.1178***	0.1068***	0.155***	0.1275***	0.1068***	0.1552***
	(0.0104)	(0.0175)	(0.024)	(0.011)	(0.0175)	(0.024)
Net worth q2*	0.0775***	0.0829***	0.0538**	0.0809***	0.0829***	0.0538**
	(0.013)	(0.0198)	(0.0245)	(0.0135)	(0.0198)	(0.0245)
Net worth q3*	0.1037***	0.0994***	0.1117***	0.1106***	0.0994***	0.1117***
	(0.013)	(0.0149)	(0.0241)	(0.0136)	(0.0149)	(0.0241)
Net worth q4*	0.1447***	0.1359***	0.208***	0.1701***	0.1359***	0.2076***
	(0.0179)	(0.022)	(0.0259)	(0.016)	(0.022)	(0.0259)
Household size	-0.0042	-0.0021	-0.0047	-0.0044	-0.0026	-0.0043
	(0.0053)	(0.0062)	(0.0056)	(0.0055)	(0.0078)	(0.005)
Age	0.0101*	0.0077	0.01	0.0104*	0.0096	0.0091
	(0.0053)	(0.0071)	(0.0073)	(0.0055)	(0.0086)	(0.0075)
Age squared	-0.0001**	-0.0001	-0.0001	-0.0001**	-0.0001	-0.0001
	(0.00004)	(0.0001)	(0.00005)	(0.00004)	(0.0001)	(0.00006)
Male *	0.051***	0.0485***	0.0145	0.0513***	0.0544***	0.034**
	(0.0089)	(0.0143)	(0.0157)	(0.0091)	(0.0132)	(0.0162)
Married *	0.0117	0.0533***	0.0357**	0.0117	0.0137	0.0027
	(0.0128)	(0.0128)	(0.0162)	(0.0129)	(0.016)	(0.0185)
Higher Education *	0.0361***	0.0133	0.0028	0.0363***	0.05***	0.0138
	(0.0112)	(0.0155)	(0.0193)	(0.0113)	(0.0151)	(0.0153)
Numeracy	0.0225***	0.0232***	0.0107**	0.0231***	0.0291***	0.0098**
	(0.0045)	(0.0047)	(0.005)	(0.0049)	(0.0059)	(0.0048)
Fluency	0.0021***	0.0022***	0.0007	0.0021***	0.0028***	0.0006
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0006)
Recall	0.0077***	0.0071**	0.006*	0.0079***	0.0089*	0.0055*
	(0.003)	(0.0036)	(0.0032)	(0.0031)	(0.0046)	(0.0031)
Sociability *	0.0159*	0.0119	0.0289**	0.016*	0.0121	0.0276**
	(0.0087)	(0.0103)	(0.0145)	(0.0087)	(0.0104)	(0.014)
Inheritance	0.0004***	0.0004***	0.0002	0.0004***	0.0005***	0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	14249	9313	4936	14249	9313	4936
R2	0.24	0.20	0.32	0.23	0.20	0.32

Note: Marginal effects evaluated at the weighted means. *** p<0.01, ** p<0.05, * p<0.1
Standard errors are reported in parentheses, calculated using 200 bootstrap replications. The R^2 measure is computed as in Harel, O. (2009.)

1.A. Appendix

A.1. Financial Assets

This section provides a brief description of the construction of financial assets data in the SHARE, while full details are given in Christelis et al. (2005). The SHARE asks questions regarding the financial assets to the financial respondents only. There are questions on seven types of assets: i) bank, transaction or saving accounts; ii) government or corporate bonds; iii) stocks or shares; iv) mutual funds or managed investment accounts; v) Individual Retirement Accounts (IRAs); vi) contractual savings for housing vii) term or whole life insurance policies. As risky assets, this paper considers stocks/shares, mutual funds invested mostly in stocks and IRAs invested mostly in stocks.

The following description is from Christelis et al. (2010). For stocks/shares (held directly), first she is asked whether she owns that asset and then if yes, in what amount. If the respondent refuses to provide the answer or claims that she does not know, she is then introduced to the unfolding brackets sequence. The financial respondent is randomly assigned to one of the three thresholds (with three threshold values varying by country) and asked whether she holds more, less or about that threshold. Depending on her answer, she might then be asked the next lower or higher threshold. The thresholds impose the range of acceptable value of asset holding, which are taken into account during the imputation process. For mutual funds and IRAs, however, the information is less detailed. The financial respondent is still asked the same question for ownership, but then if answered affirmatively, the following question is regarding only the main investment profile of the mutual fund/IRA as "mostly in stocks," "mostly in bonds" or "half stocks and half bonds". The imputations are not provided.

A.2. Description of variables

Dependent variables	
Y_i^p (dummy for stockholding) Y_i^a (share invested in stocks)	In order to use all information available (declared or imputed), the dummy for direct stockholding is assumed to be 1 if a household declared to hold stocks and/or has positive amount invested in stocks (declared or imputed). Consistently, the dummy for total stockholding takes the value of 1 if a household has dummy for direct stockholding equal to 1 and/or has declared to have assets invested in mutual funds mostly in stocks or retirement accounts mostly in stocks. The share invested in risky assets is computed as amount invested in stocks (declared or imputed) divided by the amount invested in all financial assets
Regressors	
HS discrete	SHARE asks question on self-assessment of the health status on US scale (1 = Excellent, 2 = Very good, 3 = Good, 4 = Fair, 5 = Poor). Health status at the household level is computed in the discrete form as an average of the health status of all its eligible members.
HS dummy	Binary variable taking value 1 if HS discrete is higher than 3, 0 otherwise.
Inheritance	The average probability reported by a financial respondents of leaving an inheritance greater than €50.000.
Low mood	Binary variable taking value 1 if any of the household respondents obtains above 7 on EURO-D depression scale. SHARE asks questions on 12 depression symptoms (depression, pessimism, suicidality, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment, tearfulness) which are part of EURO-D depression scale ranging from 1-12 (counting the number of symptoms reported by the respondent).
Total income	The SHARE generated variable equal to the sum of all household members' income from all sources.
Net wealth	The SHARE generated variable equal to the sum of real assets – including the value of owned property – and of the financial assets net of any debt.
Household size	Categorical variable counting the number of household members.
Age, Age2	Integer variable representing the average age of the financial respondents and its quadratic form.
Male	Binary variable taking value 1 if either of the financial respondents is male.
Married	Binary variable taking value 1 if either of the financial respondents is married.
Higher education	Binary variable taking value 1 if either of the financial respondents completed more years than duration of the current compulsory education, which is 9 years on average.
Cognitive abilities:	The average score of the households' financial respondents on the test:
Numeracy	Score computed as the number of correct answers provided to 4 simple computational questions.
Fluency	Score computed as the number of animals named in 1 minute.
Recall	Score computed as the number of words recalled out of 10.
Sociability	Binary variable taking value 1 if either of the financial respondents takes part in social, sport, political or other community-related associations during the last month.

A.2.1. Aggregating to household level

For singles, aggregating the health status to the household level is straightforward. However, for couples, the aggregation should be made with due caution. A natural question is whether the health status of each member has the same weight in affecting the household's portfolio choice. Rosen and Wu (2004) investigate this issue and find that joint effect of when both spouses are in poor health is approximately equal to the sum of the individual spouses' effects. In the present paper, thus, the health status at the household level is computed as an average of health status of all its eligible members.

Only economic variables and the perceived health variable are collapsed to the household level including imputations, which cover also non-responding partners (NRPs), while all other variables – including age, gender, marital status, education, cognitive abilities, social interactions and intention to leave a bequest – are collapsed to the household level taking into account only the financial respondents (those declared to manage household finances) since they are the ones making investment decisions in the household. For age, cognitive abilities and probability of bequest, the household level variable is obtained as the average over household financial respondents, and for education, male dummy, married dummy, social interactions dummy it is the maximum over household financial respondents. This choice for the gender dummy at the household level was made because the data show that within the household with both partners being financial respondents, it is usually male who holds more assets and earns higher income, therefore is likely to have more bargaining power in deciding on asset allocation. The choice for the married dummy at the household level was driven by the fact that within the household with two financial respondents who are not married to each other, one is usually a sibling or a child of the married one, thus is likely to have less bargaining power in the financial decisions. Finally, the dummy for the household social activities takes the maximum over financial respondents since spillover of information acquired through the social interactions are likely to be high for the people living under the same roof.

A.3. Computational algorithm

The results in this paper are obtained using STATA 12 software package. Although, STATA (11 and later versions) include the Multiple imputation (MI) package which performs Rubin combination rules on the coefficients, it does not allow postestimation commands such as margins. Thus, the estimation in this paper does not utilise the MI package, but develops own code for obtaining Rubin estimates of coefficients and standard errors, and corresponding marginal effects and their standard errors for probit and tobit. The routine is quite involved and dealing with such a large dataset led to the choice of reporting the marginal effects at the mean rather than the average marginal effects, which are found to be preferable (Train, 2003) but more computationally intensive.

Chapter 2

The Determinants of Household's Bank Switching[31]

Abstract

We investigate the determinants of households' bank switching in 2006-2012 period exploiting a unique representative dataset from Bank of Italy Survey on Household Income and Wealth that follows the households and their bank(s) over time. Focusing on the features of household-bank relationship, we find that exclusivity (using a single bank), intensity (number of services used), and scope (bank services used) of the relationship with the bank play a role in shaping households' decision to switch its bank. Moreover, we find that this decision is strongly and positively correlated with both taking out and paying off a mortgage. We also find robust evidence that risk preferences, mobility and economic condition of the household do not affect its propensity to switch, whereas education and financial literacy do matter for this decision, albeit with opposite effects. Cooperative and unlisted banks are significantly less likely to be discarded.

Keywords: household-bank relationship, switching, bank specialization

JEL Classification: G21; D14

[31]A special thanks to Giuseppe Ilardi at Bank of Italy who provided the regression estimates based on the restricted SHIW dataset.

2.1 Introduction

The bank clients are increasingly taking control of their banking relationships. The proportion of clients at the world level planning to change banks was 12% in 2012, with sensitivity to fees and charges leading the change (Ernst and Young, 2012). In response, the banks need to embrace this trend and give greater flexibility, choice and control to their customers. As Ernst and Young (2012) puts it: "*Giving more power to customers may feel uncomfortable, but in the long run banks that do so will position themselves for success in the future*". Basel III also draws attention to bank relationship with its retail clients. The Bank for International Settlements (BIS) liquidity requirements discriminate between "stable" and "unstable" deposits, whereby the condition for being stable is that: "*the depositors have other established relationships with the bank that make deposit withdrawal highly unlikely*" (paragraphs 74 and 75, BIS, 2013).

Despite these trends in retail banking and policy relevance, there is little research on the dynamics of household-bank relationship over time. From both banks' and regulator's perspective it is important to know what characteristics affect the 'stability' of a deposit. Banks can affect the relative stability of their deposits through their relationship with the clients and by attracting more stable clients. To the best of our knowledge, this paper represents the first attempt in the literature to investigate household's decision to switch its bank, focusing in particular on the features of their relationship, such as the number and type of bank services a household uses with the bank and whether it uses other banks. To this end, we exploit a unique panel dataset mainly drawn from the Bank of Italy Survey on Household Income and Wealth (SHIW) and spanning the 2006-2012 period. Italy lends itself particularly well to this analysis since as much as one out of four households in the sample change their (main) bank in the observed period. Additionally, the dataset identifies at each point in time the bank(s) chosen by each household and the bank services used. As an example, we are able to observe a household which in 2006 uses bank A to manage its payment of utilities and, in 2008 uses bank B – i.e., decides to switch from bank A to bank B – to take out a mortgage in addition to (or instead of) its payment of utilities. Complementing this household level information with bank level information from BankScope (BS) enables us to relate

households' decision to switch their bank to the features of the household-bank relationship, controlling for household, bank and background characteristics (i.e., the features of the environment).

We find robust evidence that households' bank switching is strongly associated with the household-bank relationship features in terms of exclusivity (using a single bank), intensity (number of services used), and scope (bank services used). By looking at the dynamics of bank services a household uses over time, we find that both taking out and paying off a mortgage increase the likelihood that a household switches its bank. Besides, several household characteristics which are traditionally identified as being associated with personal financial decisions – household size, marital status, education and financial literacy – matter for propensity to switch, whereas no role for the overall economic condition of the household is found. Finally, switching is found to be associated with specialization and market listing status, being less frequent among the clientele of the unlisted banks and cooperative banks.

The rest of the paper is organized as follows. Next Section reviews the literature. Section 3 formalizes the hypotheses and the estimation strategy; Section 4 describes the dataset, defines the variables of interest for the analysis, and provides the descriptive statistics; Section 5 presents the empirical findings; Section 6 discusses their robustness; finally, Section 7 concludes and formulates some policy recommendations.

2.2 Literature Review

Our study lies at the intersection of two main streams of literature, namely banking and household finance.

A well-established literature on bank-firm relationships covers, among other topics, the importance of deposit relationships in traditional lending (Hodgman, 1961; Kane and Malkiel, 1965; and Santikian, 2014), the relationship duration (Ongena and Smith, 1998, and 2001), the number of bank relationships (Ongena and Smith, 2000; Farinha and Santos, 2002; Detragiache et al., 2000), the uniqueness of bank-firm relationship (Fama, 1985; James, 1987; Lummer and McConnell, 1989), the dynamics of consumer relationship in bank loan

market (Sharpe, 1990), the importance of competition in credit markets (Petersen and Rajan, 1995), and firm's decision to switch bank (Gopalan et al., 2011; Degryse et al., 2011; Ioannidou and Ongena, 2010). Our investigation draws from this bank-firm relationship literature and adapts the framework to a household-bank relationship.

There is an increasing body of (positive) household finance literature (see Campbell, 2006, for an excellent review) that analyses how the households actually take financial decisions, relating them to households' demographic and socio-economic characteristics. The decisions investigated cover consumption and saving (see e. g., Browning and Lusardi, 1996, and the references therein), payment and borrowing, (see Cox and Jappelli, 1990, and 1993; Crook, 2001; Guiso et al., 2014), various types of insurance (Lin and Grace, 2007; Goldman and Maestas, 2013), and especially portfolio choices, concerning both financial (Guiso et al., 2002; Guiso and Sodini, 2012) and real assets (Flavin and Yamashita, 2002; Cocco, 2004; Battu et al., 2008). Remarkably, very few contributions have to date investigated the household-bank relationship. The exception is the literature on market discipline and bank runs, which focuses on clients' concern over bank's (potential) distress as a determinant of deposit interest rates, proportion of uninsured deposits, and deposit withdrawals (see e. g., Diamond and Dybvig, 1983; Iyer and Puri, 2012; Iyer et al., 2013; Demirguc-Kunt and Huizinga, 2004; Goldberg and Hudgins, 2002). Yet, in this literature the main motivation of a household for leaving its bank is the belief that the bank might fail, and thus is the same across all retail clients. By contrast, in this analysis we investigate households' decision to leave their bank focusing primarily on motives within household's needs and preferences rather than their concern over the bank's potential distress.

Our study also touches upon the contributions by Kiser (2002), Brown and Hoffmann (2013) and Brown et al. (2013). Kiser (2002) empirically investigates the covariates of switching costs and decision to switch banks using a sample of 1,500 US households drawn from the 1999 Michigan Surveys of Consumers. She looks at the household socio-economic observables and self-reported reasons for remaining with the first-ever bank, finding a positive and significant role for income, age and especially homeownership, which may have induced a "lock-in" effect and guarantee a long-term bank relationship. Brown and Hoffmann (2013) and Brown et al. (2013) rely on a telephone-based survey conducted in 2011 by GfK

that samples around 1,500 Swiss households. In the former paper, the authors focus on 470 mortgage holders with multiple bank relationships to compare the mortgage and non-mortgage relations for the same household. They find that the mortgage relations are used within a broader scope of services, are held with the banks geographically closer to the household, and are recently established compared to the non-mortgage relations. They also document a role of financial literacy, as more literate borrowers are less likely to hold a mortgage with a local bank. Brown et al. (2013) focus on the role of the switching costs and insurance coverage in mitigating the risk of deposit withdrawals from a large, distressed commercial bank in the financial crisis period (2008-2009). They find that the household-level switching costs lower the propensity to withdraw the deposits from a distressed bank, whereas no effect is found for the deposit insurance coverage.

2.3 Hypotheses and Estimation Strategy

In this section, we first discuss the main hypotheses to be tested in our empirical analysis. The households are expected to be less likely to switch if they face higher switching costs and/or have stronger ties to their bank.

The number of services (capturing the intensity of the relationship) is a well-recognized proxy for the costs of switching (see e.g., Brown et al., 2013). Namely, each bank service adds up to the total switching costs. Furthermore, the higher the number of services, the more difficult is for the household to precisely assess the total cost of switching. Multiple bank services used give rise to the economies of scope, thus further discouraging switching. Based on this argument, we formalize our first hypothesis:

Hypothesis 1: Household's propensity to switch is decreasing in the number of services it uses with the bank.

To the extent that the multiplicity of bank relationships indicates weaker bank ties, we propose our next hypothesis to be tested:

Hypothesis 2: The households having an exclusive relationship with the bank (i.e., using only one bank) are less likely to switch.

Finally, we argue that the bank-client relationship evolves over time, with the change in household needs for bank services. Switching is more likely when a household makes an important financial decision, such as taking out a mortgage, thus our third hypothesis is:

Hypothesis 3: Taking out a long-term credit is an important motivation for switching.

In order to test our hypotheses and investigate the determinants of bank switching, we estimate the following linear probability model:[32]

$$S_{it} = \alpha + \mathbf{R}_{it-1}\,\beta + \mathbf{H}_{it-1}\,\gamma + \mathbf{B}_{it-1}\,\delta + \mathbf{X}_{it-1}\,\theta \qquad (1),$$

where S_{it} (*Switch*) is a binary variable taking value 1 if household *i* changes its (main) bank between *t-1* and *t*, and 0 otherwise. Matrix **R** contains the main variables of interest, namely household-bank relationship characteristics in terms of exclusivity, intensity, and scope. Exclusivity refers to having relationship with only one bank, whereas by intensity we refer to the number of services the household uses with its main bank. Finally, the scope captures the actual nature of the household-bank relationship, i. e. which bank services are used. Matrices **H** and **B** include households' socio-economic and demographic characteristics, such as household size and income, and bank's characteristics such as specialization, size and performance, respectively. Finally, matrix **X** includes controls for background, such as time and location. This specification allows us to disentangle the effects of household-bank relationship characteristics from the potentially confounding factors, such as household and bank features, as well as characteristics of the environment, which may all be associated with household's propensity to switch a bank.

All regressors are lagged one period. This choice is driven by a twofold advantage. First, it assures the model predetermination. Using the regressors from *t* would be correct if and only if the switch from one bank to another occurred exactly in *t*. Yet, while our dependent variable *Switch* captures whether a bank switching occurred at some point in time between *t-1* and *t*, the exact timing of switching is unknown. Thus, the regressors from *t* would introduce a risk of modelling a decision as a function of observables from future point

[32] For the ease of interpretation, we report the results of the ordinary least squares analysis. Our results are almost identical when we use a probit model instead.

in time with respect to the decision itself. Second, this specification enables to investigate which are the characteristics of the discarded bank that are positively associated with switching, thereby providing more ready-to-use suggestions for the banks aiming to strengthen their ties with the households. The model is estimated by ordinary least squares, using robust standard errors clustered at the household level.

2.4 Data

2.4.1 Dataset

The Bank of Italy Survey on Household Income and Wealth (SHIW) is a biannual survey which interviews in each wave a population-representative sample of around 8,000 Italian households. Half of the interviewed households are the panel households.[33] The survey encompasses plenty of information ranging from the basic demographic to various economic variables, including detailed information on household-bank relationship(s). We are able to use the bank identifier, which enables us the following. First, we can observe which bank(s) each household uses in each wave, and, if multiple, which among those is the "main bank".[34] Second, following the panel households over time, we are able to timely trace which households change their main bank, and thus to construct our dependent variable, *Switch*. Finally, we are able to match the household-level information to detailed bank-level information from BankScope (BS) that provides extensive information from bank balance sheets and income statements on a yearly basis, as well as the information on bank history, specialization and market listing status.

Our final dataset thus provides rich set of household's characteristics and characteristics of its relationship with the bank, complemented with the information on bank

[33] The basic statistical unit in the SHIW is a household, defined as a group of cohabiting people who, regardless of their relationships, satisfy their needs by pooling all or part of their incomes. For more information on the SHIW sampling and interviewing methodologies, see Bank of Italy (2012).
[34] See next subsection for the exact wording of the SHIW questionnaire.

features, representing one of the first attempts in the literature to provide a comprehensive picture of the household-bank relationship.

2.4.2 Variable definitions

This section describes the variables included in the empirical estimation of model (1).

The core information on household-bank relationship relies on the following three questions from the SHIW. The first concerns which bank(s) the household uses ("*Which among [the listed banks] do you use?*") and the second which among those is its main bank ("*Which of [the circled banks] do you use most often?*"). The third question relevant for our research focuses on the bank services used with the main bank: *"Apart from your account, what other financial [the listed products/services] of your main bank do you use?"*. The households may indicate one or more among the following: payments of utilities, rent or other expenses; mortgage; consumer credit and personal loans; securities custody, administration and management; and insurance.

By means of this information, we construct our dependent variable, *Switch*, which is defined in t as a binary variable taking value 1 if household *i* changes its main bank between wave *t-1* and *t*, and 0 otherwise.[35] Since a household may use multiple banks, switching the main bank may capture what we refer to as "bank shuffling". This is the case when the previous main bank becomes a secondary bank, or the previous secondary bank starts to be used as the main bank – i.e., the bank is used in both periods, but what changes is its reported relative frequency of use. We, thus, construct two alternative dependent variables to be used as a robustness check: *Switch Drop* is equal to 1 if a household changes its main bank dropping its previous bank (i.e., it does not become its secondary bank), and 0 otherwise,

[35] In doing so, we took into account possible restructuring and the associated name changes at the national level. During our sample period the Italian market underwent a strong consolidation process, which might undermine the correct construction of our dependent variable. For instance, the banks that have changed names between two consecutive waves, would have all households counted as "switchers" between wave *t-1* and *t*. To correct for this, we do not consider as switching if a household uses a bank that has been involved in a merger or acquisition with the household's previous bank.

whereas *Switch New* is equal to 1 if a household switches to a bank with which it did not have any previous relationship (i.e., it does not switch to its secondary bank), and 0 otherwise.

Based on the same questions we also build the main variables of interest included in Matrix **R**, namely: (i) *Exclusivity*, a dummy taking value 1 if a household has relationship with one bank only, and 0 otherwise; (ii) Intensity (*Nr. Total services*), a categorical variable counting the number of bank services used by a household; and (iii) Scope of the relationship, function of bank services used distinguished by type, including *Payments* (payment of utilities, rent or other expenses); *Insurance*; *Mortgage*; *Consumer credit*; *Portfolio management* and *Other services* (besides the ones listed above).

Exploiting the panel dimension of our dataset, we are also able to observe the change in the bank services used with the main bank over time, thus capturing the change in the scope of a household-bank relationship. Specifically, for each bank service, we construct two dummy variables. The first dummy (*Add [Specific service]*) takes value of 1 when the household does not use that service in *t-1* but uses it in *t*, whereas the second dummy (*Drop [Specific service]*) takes value of 1 when the household uses that service in *t-1*, but no longer uses it in *t*.[36] This specification enables us to relate household's decision to switch its main bank to a change in the bank services that a household requires.

In line with the literature on household finance, matrix **H** includes standard socio-economic and demographic controls. Namely, we control for household size, as well as age, gender, marital status, education, financial literacy and risk aversion of the household head.[37] *Age* is controlled for both in linear and quadratic terms, and gender and marital status by means of two dummies for being *Male* and *Married*, respectively. Education is controlled for with two dummies for the highest education level achieved, being secondary school or college (*Medium education*) and graduate or post-graduate level (*High education*), respectively.

[36] We refer to the services used with the main bank, as we do not have information on the services used with the secondary bank(s), if any.

[37] The head of the household in the SHIW is defined as the person in charge of taking the economic and financial choices of the household.

The questions included in the SHIW financial literacy test vary slightly from wave to wave, thus we focus on the two questions common to all the waves in our sample: one referring to the mortgage types, whereas the other tests the comprehension of the real interest rates. On mortgages, the respondent is asked to indicate the type of mortgage (fixed rate, adjustable rate, or adjustable rate with fixed instalments) involving a fixed (in advance) number and amount of instalments to repay the debt. On real interest rates, respondent is asked to indicate the amount of goods he/she can buy (the same, less, or more) at the end of the year if he/she leaves 1,000 euro in a bank account, for a year, at an annual interest rate of 1% in nominal terms, when annual inflation is 2%. Accordingly, to control for household head's financial sophistication, we generate two dummies: one for providing the correct answer to only one question out of two (*Intermediate financial literacy*), and one for answering both questions correctly (*Good financial literacy*).

The survey also provides a self-reported measure of risk aversion, as the household head is asked to indicate the preferred investment profile among four types, ranging from 1 (high risk, high returns) to 4 (no risk, low returns). Our model specification includes a dummy taking value 1 if the preferred investment profile is the fourth (*Risk-averse*). The overall economic condition of the household is captured by *Disposable income* and *Net wealth*, both in quintiles. Additionally, we control for household head's main professional occupation, including dummies for being *Employee* or *Self-employed*, thereby setting the "non-working" (looking for a job, retired, students, housewives, etc.) as the reference category. Finally, mobility of the household is controlled for by means of two dummies: one for having changed municipality of residence between *t-1* and *t* (*Moved*), and one for owning the residential house (*Homeowner*).

We also include a rich set of bank-level controls (corresponding to matrix **B** in model 1), such as bank specialization, size, performance, market listing, and recent involvement in a merger or an acquisition. Bank specialization is controlled for by means of two dummies for the bank being *Cooperative* or *Saving*s, with *Commercial* banks being the reference category. Bank size is captured by the bank total assets (*Size*), whereas we also control for the bank profitability (*Return on Assets – ROA*) and leverage (*Equity over Total asset).* We also include a dummy for bank being *Listed* on the stock market and a dummy for *M&A*

involvement that takes value of 1 if the bank was involved in M&A process between *t-1* and *t*, and 0 otherwise.

In matrix **X** we include various background controls: macro-region (North-East, North-West, Centre and South) and time dummies, as well as the size of the city of residence as a proxy for bank competition.

For a detailed definition of all the variables used in the analysis see Table A1.

2.4.3 Descriptive statistics

The estimation sample covers the 2006-2012 period and consists of an unbalanced panel of 3,128 unique households, for a total of 5,081 household-year observations.[38]

Table 1 reports descriptive statistics of the estimation sample. Around one out of four households in our sample changes its main bank (*Switch)*. This ratio is multi-fold higher than a natural run-off rate of stable deposits which is 5% by BIS guidelines (BIS, 2013). These descriptive statistics are almost identical to *Switch New* and *Switch Drop*, which indicates that "bank shuffling" is not prevalent, i.e., the households who change their main bank close their accounts and switch to a bank that they haven't used before. This is a striking result if we think of a well-documented phenomenon of inertia that characterizes household choices (see e. g., Haliassos and Bertaut, 1995).

As for the household-bank relationship, 80% of the households have only one bank (*Exclusivity*) and the median household uses only one service in addition to a bank account (*Nr. Total services*). Changes in the services are the most frequent for payments (around 6% of households in the sample add this service and 11% drop it), mortgages (around 6% add it and 6% drop it) and portfolio management (7% add and 8% leave it).

[38] We exclude the households with the household head aged over 91 or below 19, as well as the households which possess neither financial nor real assets, or that report negative total consumption. We also drop the households who use a post office (around 15% of the initial sample) or who report using a bank for which we do not have information in Bankscope.

The median household counts 2 household members. The median household head is male, married, 54 years old and has completed a secondary school or college (*Medium Education*). As for the financial literacy, 33% of the respondents answered correctly one of the questions testing financial sophistication (*Intermediate Financial Literacy*), whereas 58% answered both questions correctly (*Good Financial Literacy*). The average risk aversion in our sample is 3.2 on 1 to 4 scale, where 1 represents risk-lover and 4 risk-averse profile (42% are *Risk-averse*). Around 41% of household heads are employee, 17% are self-employed, whereas the rest are not working.

A household has median annual disposable income of slightly more than €36,000 and net wealth of around €229,000. When it comes to the homeownership, around 76% of the households in our estimation sample own their residential home, whereas only 2% of the households moved from one municipality to another between two waves, suggesting that mobility of the households in our sample is quite low. Majority of the households (84%) use a commercial bank as their main bank, 7% of the households use a savings bank, whereas 9% use a cooperative bank.

Our sample includes 84 unique banks, 53 of which are commercial, 16 savings, and 15 cooperative banks. These banks are representative of the Italian banking industry, as they account for 97% of the total assets in the market. These shares are 52%, and 43% for cooperative and savings banks respectively.

The descriptive statistics for the bank-year observations are reported in Table 2. Around 26% of the banks are listed. In terms of total assets, which we use as a proxy for size, the median bank has 11.84 billion euros. Notably, the median size of the cooperative banks is quite similar to those of the commercial ones and very much aligned to the overall average bank size, indicating that bank size in our sample is not necessarily associated to the bank specialization. We also report measures of the bank profitability and its funding structure, *Equity/Total assets* and *Return on Assets (ROA)* respectively, in order to disentangle the role of the bank's specialization for household's decision to switch a bank.

2.5 Results

Table 3 reports the estimation output of the first empirical counterpart of equation (1), varying the set of controls. In Panel A, the intensity of the relationship is captured by the number of bank services used by the household in *t-1*, whereas Panel B provides a services-type break-down.

For ease of the exposition and to disentangle the determinants of bank switching, we start in column (1) by including our main variables of interest (in ***R***) and baseline controls only (municipality size dummies, region fixed effects and time fixed effects). In Column (2) we include in the estimation a set of household controls, in Column (3) we include a set of bank controls, whereas in Column (4) we include both the household and the bank controls.

The results in Panel A and Panel B show that, consistently with the hypothesis 2, having a relationship exclusively with one bank (*Exclusivity)* reduces the probability of switching by 8-9%. The effect of the number of services (*Nr. Total Services*) goes in the same direction, as reported in Panel A, thus supporting our hypothesis 1: for each additional service used at the main bank, the household is around 4% less likely to switch. In order to further investigate this issue, Panel B provides a service-type break-down. The results show that the effect is mainly driven by *Payments*, *Consumer credit* and portfolio management (*Portfolio mgmt.*), suggesting that these are the services which make the households in our sample more likely to stick to their bank. On the other hand, *Mortgage* and *Insurance* seem to form a weak tie of clients to their banks. This heterogeneity of "stickiness" across various banks services is related to the variation in the switching costs that each service entails. Changing the bank used for payments purposes implies informing all third parties associated with the service of the changed account number, whereas changing the portfolio management provider often implies untimely liquidation of the assets. The consumer credit is of lower debt burden and usually shorter maturity than a mortgage, thus the potential benefits of migrating a consumer credit to another bank are small, whereas the opposite is true for a mortgage loan. Changing insurance provider rarely entails a cost for a household.

For the household controls, Table 3 - columns (2) and (4) - shows that *Household size* slightly increases the probability of changing a bank, whereas *Age* does not affect it. The estimated effect of the marital status goes in the expected direction: the households with a

Married household head are less prone to change their bank. The rationale stems from the intra-household bargaining process, since for a couple to switch the two partners need to converge on the decision.[39] An interesting finding is that whereas education has a positive gradient, a higher level of financial literacy is strongly and negatively associated with the bank switching. This result suggests that the households with better financial comprehension are more able to choose the bank that better fits their needs in the first place, thus are less likely to need to change the bank in the future. Based on our evidence, gender, working status and risk aversion do not play a determinant role for switching, and, interestingly, even income and wealth do not affect this decision. Additionally, both proxies for mobility - namely, being homeowner and having moved - do not seem to matter. To sum up, the household characteristics that shape the bank-switching decision are household size, marital status, education and financial literacy, rather than the mobility or the overall economic condition of the household.

As for the bank's characteristics, columns (3) and (4) in Table 3 show that neither having undergone a merger & acquisition (M&A) process nor bank's performance (measured by *ROA* and *Equity/Total assets*) play a role in households' decision to remain with the bank. On the other hand, the bank specialization is important. The estimates show that the cooperative banks are considerably less likely (around 10%) to be discarded with respect to the commercial banks, whereas this is not true for the savings banks. Since we are controlling for bank's size and performance (the "hard" characteristics of a bank), the cooperative dummy captures a "soft" differentiation with respect to the commercial banks, which is primarily the difference in the value a bank attaches to its retail clients. Namely, the retails clients are at the centre of cooperative banks' business model, thus resulting in the close ties of a household to its bank. Finally, the households are more prone to leave a listed bank, which may be ascribed to a more profit-oriented management of these banks.

[39] Our starting point is the collective household model, in which the final decision of the household is the result of bargaining among all household members, as opposed to the unitary model, in which the breadwinner only takes all decisions. More on this issue e. g. in Bertocchi et al. (2014) and references therein.

Table 4 reports the estimation output of the second empirical counterpart of equation (1), in which we take into account the dynamics of the household-bank relationship via a set of dummies (*Add* and *Drop*) capturing the changes in a specific service used by the household.

The evidence referring to the *Exclusivity* and to the *Intensity* are confirmed. Yet, new insights can be obtained on the service-driven switching. Consistent with the hypothesis 3, we find that the households opening a mortgage are 15% (*Add mortgage*) more likely to switch a bank. However, closing a mortgage (*Drop mortgage*) also increases the probability of switching by 13%. According to this evidence, in our sample households' choice of a bank is strongly driven by the offered mortgage terms, but the chosen bank faces a challenge to retain them after the mortgage has been paid off. This is not surprising considering that among all bank services, the mortgages are those for which the households are more able to assess the total cost, given by the interest rate, and, thus, the advantages of switching a bank. One might argue that the same holds for the consumer credit, yet, the mortgages are associated with the purchase of a house, which is typically one of the most important investment decisions in a household's life-cycle, therefore entailing a higher level of due diligence that the households exercise.

The time dummies, not shown in Tables 3 and 4 for reasons of space, suggest a decreasing trend in the probability to change a bank relative to 2008.

2.6 Robustness

All results presented in the previous section are robust to the alternative specifications of both the dependent variable and several controls.

2.6.1 Dependent variable

With our dependent variable, we aim to capture household's decision to change its bank. We, thus, define our baseline dependent variable *Switch* as being 1 if a household changes its main bank between waves *t-1* and *t*. While definition of switching is straightforward for the households using only one bank and switching to another single bank

relationship, for the households using multiple banks our measure of switching may capture what we refer to as "bank shuffling". These concerns are mitigated by the peculiarity of our sample in which the majority of households use only one bank. However, to address this issue explicitly, we test the robustness of our results to more restrictive measures of switching, *Switch New* and *Switch Drop,* as defined in section 2.4.2. The results are reported in Tables 5 to 8 and are qualitatively similar to those obtained in Tables 3 and 4.

2.6.2 Control variables

In the specifications reported in Table 9 and Table 10 we use two alternative measures to *Exclusivity* to capture household's loyalty to its main bank, namely the number of banks used by the household (*Nr. Banks*) and a dummy taking value 1 if a household has been using its main bank for 10 years or more (*Long-lasting relationship*).[40] In both tables, the former shows a positive marginal effect suggesting that for each additional bank used, a household is around 6% more likely to change its main bank. Similarly in Table 10, the households who have been using their main bank since a long ago are 11% less likely to replace it with another bank.

2.7 Conclusion

This paper empirically investigates the household's decision to change its main bank, a timely issue considering the increasing attention devoted to it by the practitioners and the policy makers.

To this end, we rely on a dataset which is unique on several grounds. First, it observes households and their bank(s) over time, providing ample information about the bank services used. This means that households' decision to switch or stay is timely observed, rather than inferred based on retrospective or question on intention to switch, and can be related to the bank services used. Second, the dataset relies on a survey which is representative of the entire population. Third, it refers to the 2006-2012 period and to the Italian market, which particularly lends itself to this analysis since: (i) as much as one out of four of the households

[40] According to Table 1, majority of the households use one bank only and have been with their main bank for over 10 years.

do change their main bank; and (ii) it is highly representative of the Italian bank market, enabling us to gauge the differences in switching vulnerability of different types of banks. We find that, even after controlling for household's and bank's characteristics, the households are more reluctant to switch if they have an exclusive, long-lasting relationship with their bank, and/or use the bank more intensely. Specifically, a household having an exclusive relationship with the bank (or using the bank for longer than 10 years) is about 9-10% less likely to switch, whereas for each additional service used, the probability of switching a bank reduces by 4%. The latter result confirms the role of switching costs as discussed in the literature. Finally, the scope of the relationship also matters since long-term credit services (a mortgage) are found to be a strong driver of household's decision to switch its bank, both when taking it out and having paid it off. These results suggest that households' choice of a bank is strongly driven by the offered mortgage terms, but also that a chosen bank faces a challenge in retaining the clients after the mortgage has been paid off.

We also find that household size, marital status, education and financial literacy are associated with the decision to change bank, whereas mobility and the overall economic condition of the household are not. Some of the characteristics of the discarded bank also matter, with the cooperative banks being significantly less likely to be abandoned. This result frames into the recently increasing attention devoted to the cooperative banks from academics, politicians and the public, who have wondered whether their specific characteristics have provided them with a safer shelter against the propagation of the global financial crisis.

Our result that the cooperative banks are significantly less likely to be discarded, may serve as a recommendation to the policy makers. So far, Basel III liquidity requirements strongly discriminate between "stable" and "unstable" customer deposits. More specifically, the regulators assume that customer deposits which are embedded in a well-established bank-client relationship are less subject to the withdrawal risk, thereby shaping liquidity requirements based on the intensity of the relationship. According to our evidence, we can add that liquidity requirements should evaluate the stability of the relationship not only based on its intensity but also based on the bank's specialization.

2.8 References

Bank of Italy (2012). Supplements to the Statistical Bulletin, Sample Surveys, Household Income and Wealth in 2010.

Battu, H., Ma, A., & Phimister, E. (2008). Housing Tenure, Job Mobility and Unemployment in the UK. *The Economic Journal*, *118*(527), 311-328.

Bertocchi, G., Brunetti, M., & Torricelli, C. (2014). Who holds the purse strings within the household? The determinants of intra-family decision making. *Journal of Economic Behavior & Organization*, *101*, 65-86.

Bank for International Settlements (2013). Basel III: The liquidity coverage ratio and liquidity risk monitoring tools. Basel committee on banking supervision, *BIS.*

Brown, M., & Hoffmann, M. (2013). Mortgage Relationships. *University of St. Gallen, School of Finance Research Paper*, (2013/10).

Brown, M., Guin, B., & Morkoetter, S. (2013). Switching costs, deposit insurance and deposit withdrawals from distressed banks. *Swiss Institute of Banking and Finance, Working Paper on Finance*, (2013/19).

Browning, M., & Lusardi, A. (1996). Household saving: Micro theories and micro facts. *Journal of Economic literature*, 1797-1855.

Campbell, J. Y. (2006). Household finance. *The Journal of Finance*, *61*(4), 1553-1604.

Cocco, J. F. (2005). Portfolio choice in the presence of housing. *Review of Financial studies*, *18*(2), 535-567.

Cox, D., & Jappelli, T. (1990). Credit rationing and private transfers: Evidence from survey data. *The Review of Economics and Statistics*, 445-454.

Cox, D., & Jappelli, T. (1993). The effect of borrowing constraints on consumer liabilities. *Journal of Money, Credit and Banking*, 197-213.

Crook, J. (2001). The demand for household debt in the USA: evidence from the 1995 Survey of Consumer Finance. *Applied Financial Economics*, *11*(1), 83-91.

Degryse, H., Masschelein, N., & Mitchell, J. (2010). Staying, dropping, or switching: the impacts of bank mergers on small firms. *Review of Financial Studies*, hhp126.

Demirgüç-Kunt, A., & Huizinga, H. (2004). Market discipline and deposit insurance. *Journal of Monetary Economics*, *51*(2), 375-399.

Detragiache, E., Garella, P., & Guiso, L. (2000). Multiple versus single banking relationships: Theory and evidence. *The Journal of Finance*, *55*(3), 1133-1161.

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *The Journal of Political Economy*, 401-419.

Ernst and Young (2012). Global Consumer Banking Survey 2012

Fama, E. F. (1985). What's different about banks?. *Journal of Monetary Economics*, *15*(1), 29-39.

Farinha, L. A., & Santos, J. A. (2002). Switching from single to multiple bank lending relationships: Determinants and implications. *Journal of Financial Intermediation*, *11*(2), 124-151.

Flavin, M., & Yamashita, T. (2002). Owner-occupied housing and the composition of the household portfolio. *American Economic Review*, 345-362.

Goldberg, L. G., & Hudgins, S. C. (2002). Depositor discipline and changing strategies for regulating thrift institutions. *Journal of Financial Economics*, *63*(2), 263-274.

Goldman, D., & Maestas, N. (2013). Medical expenditure risk and household portfolio choice. *Journal of Applied Econometrics*, *28*(4), 527-550.

Gopalan, R., Udell, G. F., & Yerramilli, V. (2011). Why do firms form new banking relationships?. *Journal of Financial and Quantitative Analysis*, *46*(05), 1335-1365.

Guiso, L., Foà G., Gambacorta L., & Mistrulli P. (2014). The Supply Side of Household Finance, *mimeo.*

Guiso, L., & Sodini, P. (2012). Household finance: An emerging field, in Handbook of the Economics of Finance, G. Constantinides, M. Harris & R. Stulz (Eds.), 1397-1531, North Holland.

Guiso, L., Haliassos, M., & Jappelli, T. (Eds.). (2002). *Household portfolios*. MIT press.

Haliassos, M., & Bertaut, C. C. (1995). Why do so few hold stocks?. *The Economic Journal*, 1110-1129.

Hodgman, D. R. (1961). The deposit relationship and commercial bank investment behavior. *The Review of Economics and Statistics*, 257-268.

Ioannidou, V., & Ongena, S. (2010). "Time for a change": loan conditions and bank behavior when firms switch banks. *The Journal of Finance*, *65*(5), 1847-1877.

Iyer, R., & Puri, M. (2008). Understanding bank runs: The importance of depositor bank relationships and networks. *American Economic Review*, 102(4), 1414-1445.

Iyer, R., Puri, M., & Ryan, N. (2013). Do depositors monitor banks?. *NBER Working Paper* No. 19050.

James, C. (1987). Some evidence on the uniqueness of bank loans. *Journal of Financial Economics*, *19*(2), 217-235.

Kane, E. J., & Malkiel, B. G. (1965). Bank portfolio allocation, deposit variability, and the availability doctrine. *The Quarterly Journal of Economics*, 113-134.

Kiser, E. K. (2002). Switching behavior and switching costs in household deposits. *Review of Industrial Organization*, 20(4), 349-365.

Lin, Y., & Grace, M. F. (2007). Household life cycle protection: Life insurance holdings, financial vulnerability, and portfolio implications. *Journal of Risk and Insurance*, *74*(1), 141-173.

Lummer, S. L., & McConnell, J. J. (1989). Further evidence on the bank lending process and the capital-market response to bank loan agreements. *Journal of Financial Economics*, *25*(1), 99-122.

Ongena, S., & Smith, D. C. (1998). *Quality and duration of banking relationships* (No. urn: nbn: nl: ui: 12-80677). Tilburg University.

Ongena, S., & Smith, D. C. (2000). What determines the number of bank relationships? Cross-country evidence. *Journal of Financial intermediation*, *9*(1), 26-56.

Ongena, S., & Smith, D. C. (2001). The duration of bank relationships. *Journal of Financial Economics*, *61*(3), 449-475.

Petersen, M. A., & Rajan, R. G. (1995). The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics*, 407-443.

Santikian, L. (2014). The ties that bind: Bank relationships and small business lending. *Journal of Financial Intermediation*, *23*(2), 177-213.

Sharpe, S. A. (1990). Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships. *The Journal of Finance*,*45*(4), 1069-1087.

Zinman, J. (2014). Household Debt: Facts, Puzzles, Theories, and Policies. *NBER Working Paper* No. 20496.

2.9 Tables

Table 1: Descriptive statistics on estimation sample (household level)

Dependent variables	**Obs**	**Mean**	**Median**	**Min**	**Max**	**St.Dev.**
Full sample						
Switch	5,081	0.23	0	0	1	0.42
Switch New	5,081	0.22	0	0	1	0.41
Switch Drop	5,081	0.22	0	0	1	0.41
Control variables						
	Obs	**Mean**	**Median**	**Min**	**Max**	**St.Dev.**
***R**: Household-bank relationship characteristics*						
Exclusivity	5,081	0.80	1	0	1	0.40
Nr. Banks	5,081	1.24	1	1	5	0.50
Long-lasting relationship	4,166	0.65	1	0	1	0.48
Nr. Total services	5,081	1.37	1	0	5	0.76
Payments	5,081	0.90	1	0	1	0.30
Insurance	5,081	0.04	0	0	1	0.19
Mortgage	5,081	0.15	0	0	1	0.36
Consumer credit	5,081	0.04	0	0	1	0.20
Portfolio mgmt.	5,081	0.20	0	0	1	0.40
Other services	5,081	0.04	0	0	1	0.21
Add payments	5,081	0.06	0	0	1	0.23
Add insurance	5,081	0.02	0	0	1	0.14
Add mortgage	5,081	0.06	0	0	1	0.23
Add consumer credit	5,081	0.04	0	0	1	0.21
Add portfolio mgmt.	5,081	0.07	0	0	1	0.26
Add other services	5,081	0.05	0	0	1	0.21
Drop payments	5,081	0.11	0	0	1	0.32
Drop insurance	5,081	0.02	0	0	1	0.15
Drop mortgage	5,081	0.06	0	0	1	0.23
Drop consumer credit	5,081	0.03	0	0	1	0.16
Drop portfolio mgmt.	5,081	0.08	0	0	1	0.26
Drop other services	5,081	0.03	0	0	1	0.18

Table 1: Descriptive statistics on estimation sample (ctd.)

	Obs	Mean	Median	Min	Max	St.Dev.
***H**: Household characteristics*						
Household size	5,081	2.63	2	1	8	1.24
Age	5,081	54.31	54	20	90	14.33
Male	5,081	0.66	1	0	1	0.47
Married	5,081	0.69	1	0	1	0.46
Education	5,081	3.47	3	1	6	0.99
Medium education	5,081	0.69	1	0	1	0.46
High education	5,081	0.14	0	0	1	0.35
Financial literacy	5,081	1.48	2	0	2	0.67
Intermediate financial literacy	5,081	0.33	0	0	1	0.47
Good financial literacy	5,081	0.58	1	0	1	0.49
Risk-aversion	5,081	3.24	3	1	4	0.76
Risk-averse	5,081	0.42	0	0	1	0.49
Moved	5,081	0.02	0	0	1	0.14
Homeowner	5,081	0.76	1	0	1	0.43
Employee	5,081	0.41	0	0	1	0.49
Self-employed	5,081	0.17	0	0	1	0.38
Income (€1,000)	5,081	43.01	36.24	0	427.95	28.37
Net wealth (€1,000)	5,081	356.50	229.13	-875.42	30,934	745.74
***B**: Bank characteristics*						
Commercial	5,081	0.84	1	0	1	0.37
Savings	5,081	0.07	0	0	1	0.25
Cooperative	5,081	0.09	0	0	1	0.29
Size (in logs)	5,081	11.04	11.09	7.92	13.95	1.42
ROA	5,081	0.67	0.78	-1.4	2.36	0.46
Equity/Total assets	5,081	7.08	6.88	2.35	25.21	2.84
Listed	5,081	0.41	0	0	1	0.49
M&A	5,081	0.13	0	0	1	0.33

Note: *all statistics are computed using sample weights.*

Table 2: Descriptive statistics at the bank level

Variable	Obs	Mean	Median	Min	Max	St.Dev.
Commercial	238	0.61	1	0	1	0.49
Savings	238	0.21	0	0	1	0.41
Coop	238	0.18	0	0	1	0.39
Listed	238	0.26	0	0	1	0.44
Total assets (billions euro)	238	50.76	11.84	2.39	1,142.03	153.19
-Commercial	146	71.2	14.92	2.76	1,142.03	192.15
-Savings	49	11.29	5.67	2.39	50.8	11.75
-Cooperative	43	26.32	11.89	2.81	135.79	30.18
Return on Assets (ROA) %	238	0.41	0.47	-6.7	2.36	0.77
-Commercial	146	0.42	0.52	-6.7	2.36	0.91
-Savings	49	0.34	0.40	-1	1.43	0.55
-Cooperative	43	0.45	0.46	-1.17	1.07	0.40
Equity/Total assets %	238	7.85	7.48	1.44	25.21	3.09
-Commercial	146	7.63	7.00	1.44	25.21	3.54
-Savings	49	7.47	7.20	3.76	11.93	1.61
-Cooperative	43	9.05	8.62	5.18	17.32	2.40

Table 3: Probability to switch, main specification.
Panel A

Independent variables	(1)	(2)	(3)	(4)
***R**: Household-bank relationship characteristics*				
Exclusivity	-0.081***	-0.084***	-0.085***	-0.087***
	(0.021)	(0.022)	(0.021)	(0.022)
Nr. Total services	-0.040***	-0.035***	-0.043***	-0.037***
	(0.011)	(0.011)	(0.011)	(0.011)
***H**: Household controls*				
Household size		0.019*		0.020**
		(0.010)		(0.010)
Age		0.004		0.003
		(0.005)		(0.004)
Age^2		-0.003		-0.003
		(0.004)		(0.004)
Male		-0.018		-0.010
		(0.021)		(0.021)
Married		-0.071***		-0.075***
		(0.027)		(0.027)
Medium education		0.087***		0.087***
		(0.024)		(0.024)
High education		0.098***		0.096***
		(0.035)		(0.035)
Intermediate fin.lit.		-0.082***		-0.079**
		(0.032)		(0.032)
Good fin.lit.		-0.114***		-0.111***
		(0.031)		(0.030)
Risk-averse		-0.015		-0.014
		(0.016)		(0.016)
Moved		-0.060		-0.062
		(0.051)		(0.052)
Homeowner		-0.003		-0.009
		(0.028)		(0.028)
Employee		-0.003		-0.006
		(0.025)		(0.025)
Self-employed		-0.020		-0.015
		(0.032)		(0.032)
Income – Q2		0.012		0.006
		(0.040)		(0.040)
Income – Q3		0.008		0.002
		(0.039)		(0.038)
Income – Q4		0.011		0.008
		(0.040)		(0.040)
Income – Q5		0.038		0.032
		(0.044)		(0.044)
Net Wealth – Q2		0.015		0.021
		(0.035)		(0.035)
Net Wealth – Q3		0.041		0.045
		(0.042)		(0.041)
Net Wealth – Q4		0.026		0.027
		(0.041)		(0.041)

Table 3 – Panel A (continued)

	(1)	(2)	(3)	(4)
Net Wealth – Q5		-0.041		-0.036
		(0.044)		(0.043)
***B**: Bank controls*				
Cooperative			-0.105***	-0.098***
			(0.027)	(0.027)
Savings			0.003	-0.003
			(0.034)	(0.034)
Size (in logs)			0.014*	0.014*
			(0.008)	(0.008)
Listed			0.086***	0.081***
			(0.023)	(0.022)
ROA			-0.002	0.003
			(0.023)	(0.023)
Equity/Total assets			0.003	0.004
			(0.004)	(0.003)
M&A			0.009	0.009
			(0.026)	(0.026)
Macro_Regions controls	YES	YES	YES	YES
Municipality Size controls	YES	YES	YES	YES
Observations	5,081	5,081	5,081	5,081
R-squared	0.027	0.047	0.047	0.066

Robust standard errors in the parentheses, clustered at the household level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3 (continued): Probability to switch, main specification.
Panel B

Independent variables	(1)	(2)	(3)	(4)
***R**: Household-bank relationship characteristics*				
Exclusivity	-0.080***	-0.082***	-0.085***	-0.086***
	(0.021)	(0.022)	(0.021)	(0.022)
Payments	-0.076**	-0.072**	-0.072**	-0.067**
	(0.033)	(0.031)	(0.032)	(0.031)
Insurance	-0.052	-0.041	-0.045	-0.035
	(0.037)	(0.036)	(0.036)	(0.036)
Mortgage	-0.008	-0.006	-0.008	-0.004
	(0.025)	(0.025)	(0.024)	(0.024)
Consumer credit	-0.070**	-0.078**	-0.086**	-0.092***
	(0.035)	(0.034)	(0.035)	(0.034)
Portfolio mgmt.	-0.049**	-0.040*	-0.058***	-0.049**
	(0.021)	(0.022)	(0.021)	(0.022)
Other services	0.039	0.049	0.036	0.045
	(0.046)	(0.044)	(0.044)	(0.043)
***H**: Household controls*				
Household size		0.019*		0.020**
		(0.010)		(0.010)
Age		0.004		0.004
		(0.004)		(0.004)
Age^2		-0.004		-0.003
		(0.004)		(0.004)
Male		-0.016		-0.008
		(0.021)		(0.021)
Married		-0.074***		-0.079***
		(0.027)		(0.026)
Medium education		0.088***		0.088***
		(0.024)		(0.024)
High education		0.099***		0.098***
		(0.035)		(0.035)
Intermediate fin.lit.		-0.077**		-0.074**
		(0.031)		(0.031)
Good fin.lit.		-0.110***		-0.107***
		(0.030)		(0.030)
Risk-averse		-0.015		-0.014
		(0.016)		(0.016)
Moved		-0.064		-0.067
		(0.051)		(0.052)
Homeowner		-0.012		-0.019
		(0.028)		(0.028)
Employee		-0.003		-0.006
		(0.025)		(0.025)
Self-employed		-0.027		-0.022
		(0.033)		(0.032)
Income – Q2		0.017		0.011
		(0.040)		(0.039)
Income – Q3		0.013		0.006
		(0.039)		(0.038)
Income – Q4		0.019		0.015
		(0.040)		(0.039)

Table 3 – Panel B (continued)

	(1)	(2)	(3)	(4)
Income – Q5		0.047		0.039
		(0.044)		(0.044)
Net Wealth – Q2		0.013		0.020
		(0.035)		(0.035)
Net Wealth – Q3		0.041		0.048
		(0.042)		(0.041)
Net Wealth – Q4		0.032		0.035
		(0.042)		(0.041)
Net Wealth – Q5		-0.036		-0.028
		(0.044)		(0.044)
***B**: Bank controls*				
Cooperative			-0.108***	-0.101***
			(0.028)	(0.027)
Savings			-0.000	-0.006
			(0.034)	(0.034)
Size (in logs)			0.013*	0.014*
			(0.008)	(0.008)
Listed			0.088***	0.082***
			(0.023)	(0.023)
ROA			-0.001	0.004
			(0.023)	(0.023)
Equity/Total assets			0.003	0.004
			(0.004)	(0.003)
M&A			0.009	0.009
			(0.027)	(0.026)
Macro_Regions controls	YES	YES	YES	YES
Municipality Size controls	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
Observations	5,081	5,081	5,081	5,081
R-squared	0.030	0.050	0.050	0.070

Robust standard errors in the parentheses, clustered at the household level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Probability to switch, change services specification

Independent variables	(1)	(2)	(3)	(4)
***R**: Household-bank relationship characteristics*				
Exclusivity	-0.074***	-0.079***	-0.078***	-0.083***
	(0.022)	(0.022)	(0.021)	(0.022)
Nr. Total services	-0.049***	-0.044***	-0.052***	-0.046***
	(0.015)	(0.016)	(0.015)	(0.016)
Add payments	0.075*	0.074*	0.074*	0.073*
	(0.045)	(0.042)	(0.043)	(0.040)
Drop payments	-0.004	0.003	-0.010	-0.004
	(0.027)	(0.027)	(0.027)	(0.027)
Add insurance	-0.038	-0.024	-0.047	-0.034
	(0.052)	(0.051)	(0.051)	(0.050)
Drop insurance	0.019	0.022	0.027	0.029
	(0.047)	(0.049)	(0.048)	(0.049)
Add mortgage	0.145***	0.145***	0.147***	0.148***
	(0.042)	(0.042)	(0.041)	(0.041)
Drop mortgage	0.120***	0.122***	0.128***	0.129***
	(0.039)	(0.039)	(0.039)	(0.038)
Add consumer credit	-0.008	-0.007	-0.014	-0.014
	(0.039)	(0.039)	(0.039)	(0.038)
Drop consumer credit	-0.021	-0.030	-0.036	-0.045
	(0.048)	(0.046)	(0.048)	(0.047)
Add portfolio mgmt.	-0.002	-0.001	-0.006	-0.005
	(0.030)	(0.030)	(0.030)	(0.030)
Drop portfolio mgmt.	0.036	0.040	0.035	0.037
	(0.029)	(0.029)	(0.029)	(0.029)
Add other	-0.035	-0.029	-0.039	-0.033
	(0.032)	(0.031)	(0.032)	(0.031)
Drop other	0.082	0.086	0.082	0.084
	(0.056)	(0.054)	(0.054)	(0.052)
***H**: Household controls*				
Household size		0.018*		0.019**
		(0.010)		(0.010)
Age		0.004		0.003
		(0.004)		(0.004)
Age^2		-0.003		-0.002
		(0.004)		(0.004)
Male		-0.021		-0.012
		(0.021)		(0.021)
Married		-0.074***		-0.079***
		(0.027)		(0.026)
Medium education		0.088***		0.088***
		(0.024)		(0.023)
High education		0.098***		0.096***
		(0.035)		(0.034)
Intermediate fin.lit.		-0.072**		-0.069**
		(0.031)		(0.031)
Good fin.lit.		-0.106***		-0.102***
		(0.030)		(0.030)

Table 4 (continued)

	(1)	(2)	(3)	(4)
Risk-averse		-0.015		-0.014
		(0.016)		(0.016)
Moved		-0.066		-0.068
		(0.051)		(0.052)
Homeowner		-0.013		-0.020
		(0.028)		(0.028)
Employee		-0.008		-0.012
		(0.025)		(0.025)
Self-employed		-0.034		-0.028
		(0.033)		(0.032)
Income – Q2		0.020		0.015
		(0.040)		(0.039)
Income – Q3		0.016		0.010
		(0.039)		(0.038)
Income – Q4		0.018		0.015
		(0.040)		(0.040)
Income – Q5		0.047		0.040
		(0.044)		(0.044)
Net Wealth – Q2		0.012		0.018
		(0.035)		(0.035)
Net Wealth – Q3		0.038		0.043
		(0.042)		(0.041)
Net Wealth – Q4		0.029		0.030
		(0.041)		(0.041)
Net Wealth – Q5		-0.039		-0.033
		(0.044)		(0.043)
***B**: Bank controls*				
Cooperative			-0.112***	-0.104***
			(0.028)	(0.027)
Savings			0.003	-0.003
			(0.034)	(0.034)
Size (in logs)			0.013	0.014*
			(0.008)	(0.008)
Listed			0.090***	0.084***
			(0.023)	(0.022)
ROA			-0.003	0.003
			(0.024)	(0.023)
Equity/Total assets			0.003	0.004
			(0.004)	(0.003)
M&A			0.004	0.004
			(0.026)	(0.026)
Macro_Regions controls	YES	YES	YES	YES
Municipality Size controls	YES	YES	YES	YES
Observations	5,081	5,081	5,081	5,081
R-squared	0.040	0.061	0.062	0.081

Robust standard errors in the parentheses, clustered at the household level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Robustness: Switch New as dependent, main specification.

	(1)	(2)
***R**: Household-bank relationship characteristics*		
Exclusivity	-0.030	-0.029
	(0.021)	(0.021)
Nr. Total services	-0.036***	
	(0.011)	
Payments		-0.070**
		(0.030)
Insurance		-0.024
		(0.036)
Mortgage		-0.011
		(0.024)
Consumer credit		-0.092***
		(0.033)
Portfolio mgmt.		-0.036*
		(0.022)
Other services		0.023
		(0.043)
***B**: Bank controls*		
Cooperative	-0.088***	-0.090***
	(0.026)	(0.027)
Savings	0.001	0.001
	(0.034)	(0.034)
Size (in logs)	0.015**	0.015**
	(0.008)	(0.008)
Listed	0.077***	0.077***
	(0.022)	(0.022)
ROA	0.003	0.003
	(0.022)	(0.022)
Equity/Total assets	0.004	0.003
	(0.004)	(0.003)
M&A	0.009	0.009
	(0.026)	(0.026)
***H**: Household controls*		
Household size	0.021**	0.021**
	(0.010)	(0.010)
Age	0.003	0.004
	(0.004)	(0.004)
Age^2	-0.003	-0.003
	(0.004)	(0.004)
Male	-0.014	-0.014
	(0.020)	(0.020)

	(1) ctd	(2) ctd
***H**: Household controls (ctd)*		
Married	-0.078***	-0.081***
	(0.026)	(0.026)
Medium education	0.081***	0.081***
	(0.023)	(0.023)
High education	0.098***	0.098***
	(0.034)	(0.034)
Intermediate fin.lit.	-0.063**	-0.058*
	(0.031)	(0.031)
Good fin.lit.	-0.098***	-0.094***
	(0.030)	(0.030)
Risk-averse	-0.012	-0.012
	(0.016)	(0.016)
Moved	-0.060	-0.064
	(0.051)	(0.051)
Homeowner	-0.014	-0.021
	(0.027)	(0.027)
Employee	-0.016	-0.016
	(0.025)	(0.025)
Self-employed	-0.008	-0.013
	(0.031)	(0.031)
Income – Q2	0.004	0.009
	(0.040)	(0.039)
Income – Q3	0.002	0.007
	(0.038)	(0.038)
Income – Q4	0.008	0.014
	(0.039)	(0.039)
Income – Q5	0.027	0.034
	(0.044)	(0.043)
Net Wealth – Q2	0.020	0.018
	(0.035)	(0.035)
Net Wealth – Q3	0.049	0.049
	(0.041)	(0.041)
Net Wealth – Q4	0.027	0.031
	(0.040)	(0.041)
Net Wealth – Q5	-0.034	-0.031
	(0.043)	(0.043)
Observations	5,081	5,081
Pseudo-R^2	0.062	0.065

Switch New used as dependent variable in alternative to Switch. All regression specifications include matrix **X** (dummies for time and area of residence, municipality size dummies), that are omitted due to space considerations.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Robustness: Switch New as dependent, change services specification.

	(1)
***R**: Household-bank relationship characteristics*	
Exclusivity	-0.027
	(0.021)
Nr. Total services	-0.040**
	(0.016)
Add payments	0.081**
	(0.040)
Drop payments	-0.014
	(0.025)
Add insurance	-0.031
	(0.048)
Drop insurance	0.033
	(0.049)
Add mortgage	0.134***
	(0.040)
Drop mortgage	0.108***
	(0.037)
Add consumer credit	-0.017
	(0.037)
Drop consumer credit	-0.043
	(0.047)
Add portfolio mgmt.	0.002
	(0.030)
Drop portfolio mgmt.	0.037
	(0.029)
Add other	-0.029
	(0.030)
Drop other	0.049
	(0.049)
***B**: Bank controls*	
Cooperative	-0.093***
	(0.027)
Savings	0.003
	(0.034)
Size (in logs)	0.015*
	(0.008)
ROA	0.079***
	(0.022)
Equity/Total assets	0.002
	(0.022)
Listed	0.003
	(0.003)
M&A	0.005
	(0.025)

	(1) ctd
***H**: Household controls*	(2)
Household size	0.021**
	(0.010)
Age	0.003
	(0.004)
Age^2	-0.003
	(0.004)
Male	-0.017
	(0.020)
Married	-0.081***
	(0.026)
Medium education	0.081***
	(0.023)
High education	0.096***
	(0.034)
Intermediate fin.lit.	-0.053*
	(0.030)
Good fin.lit.	-0.090***
	(0.030)
Risk -averse	-0.012
	(0.016)
Moved	-0.065
	(0.051)
Homeowner	-0.023
	(0.027)
Employee	-0.021
	(0.024)
Self-employed	-0.020
	(0.031)
Income – Q2	0.011
	(0.039)
Income – Q3	0.009
	(0.038)
Income – Q4	0.013
	(0.039)
Income – Q5	0.033
	(0.043)
Net Wealth – Q2	0.017
	(0.035)
Net Wealth – Q3	0.045
	(0.040)
Net Wealth – Q4	0.028
	(0.040)
Net Wealth – Q5	-0.034
	(0.043)
Observations	5,081
Pseudo-R^2	0.074

Switch New used as dependent variable in alternative to Switch. All regression specifications include matrix **X** (dummies for time and area of residence, municipality size dummies), that are omitted due to space considerations.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Robustness: Switch Drop as dependent, main specification.

	(1)	(2)
***R**: Household-bank relationship characteristics*		
Exclusivity	-0.033	-0.032
	(0.021)	(0.021)
Nr. Total services	-0.035***	
	(0.011)	
Payments		-0.068**
		(0.030)
Insurance		-0.021
		(0.036)
Mortgage		-0.009
		(0.023)
Consumer credit		-0.092***
		(0.033)
Portfolio mgmt.		-0.043**
		(0.021)
Other services		0.048
		(0.043)
***B**: Bank controls*		
Cooperative	-0.094***	-0.096***
	(0.025)	(0.026)
Savings	0.004	0.001
	(0.034)	(0.034)
Size (in logs)	0.017**	0.017**
	(0.008)	(0.008)
Listed	0.065***	0.065***
	(0.022)	(0.022)
ROA	-0.002	-0.001
	(0.022)	(0.022)
Equity/Total assets	0.005	0.005
	(0.004)	(0.003)
M&A	0.006	0.006
	(0.025)	(0.025)
***H**: Household controls*		
Household size	0.017*	0.017*
	(0.010)	(0.010)
Age	0.003	0.003
	(0.004)	(0.004)
Age^2	-0.002	-0.002
	(0.004)	(0.004)
Male	-0.018	-0.017
	(0.020)	(0.020)

	(1) ctd	(2) ctd
***H**: Household controls (ctd)*		
Married	-0.068***	-0.071***
	(0.025)	(0.025)
Medium education	0.080***	0.081***
	(0.023)	(0.023)
High education	0.088***	0.089***
	(0.034)	(0.034)
Intermediate fin.lit.	-0.069**	-0.064**
	(0.031)	(0.031)
Good fin.lit.	-0.105***	-0.101***
	(0.030)	(0.030)
Risk-averse	-0.010	-0.011
	(0.016)	(0.016)
Moved	-0.054	-0.058
	(0.052)	(0.051)
Homeowner	-0.012	-0.020
	(0.027)	(0.027)
Employee	0.012	0.013
	(0.024)	(0.024)
Self-employed	0.004	-0.003
	(0.031)	(0.031)
Income – Q2	-0.000	0.005
	(0.040)	(0.039)
Income – Q3	-0.000	0.004
	(0.038)	(0.038)
Income – Q4	-0.001	0.006
	(0.039)	(0.039)
Income – Q5	0.022	0.029
	(0.043)	(0.043)
Net Wealth – Q2	0.024	0.023
	(0.035)	(0.035)
Net Wealth – Q3	0.044	0.045
	(0.040)	(0.041)
Net Wealth – Q4	0.037	0.043
	(0.040)	(0.040)
Net Wealth – Q5	-0.029	-0.024
	(0.042)	(0.043)
Observations	5,081	5,081
Pseudo-R^2	0.061	0.065

Switch Drop used as dependent variable in alternative to Switch. All regression specifications include matrix **X** (dummies for time and area of residence, municipality size dummies), that are omitted due to space considerations.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Robustness: Switch Drop as dependent, change services specification.

	(1)
***R**: Household-bank relationship characteristics*	
Exclusivity	-0.029
	(0.021)
Nr. Total services	-0.046***
	(0.015)
Add payments	0.070*
	(0.040)
Drop payments	-0.011
	(0.026)
Add insurance	-0.021
	(0.048)
Drop insurance	0.048
	(0.049)
Add mortgage	0.135***
	(0.040)
Drop mortgage	0.125***
	(0.038)
Add consumer credit	-0.009
	(0.037)
Drop consumer credit	-0.036
	(0.047)
Add portfolio mgmt.	-0.006
	(0.029)
Drop portfolio mgmt.	0.040
	(0.028)
Add other	-0.040
	(0.030)
Drop other	0.088*
	(0.052)
***B**: Bank controls*	
Cooperative	-0.099***
	(0.026)
Savings	0.004
	(0.034)
Size (in logs)	0.017**
	(0.008)
ROA	0.067***
	(0.022)
Equity/Total assets	-0.002
	(0.022)
Listed	0.005
	(0.003)
M&A	0.002
	(0.025)

	(1) ctd
***H**: Household controls*	(2)
Household size	0.017*
	(0.010)
Age	0.003
	(0.004)
Age^2	-0.002
	(0.004)
Male	-0.020
	(0.020)
Married	-0.071***
	(0.025)
Medium education	0.081***
	(0.023)
High education	0.088***
	(0.033)
Intermediate fin.lit.	-0.059*
	(0.031)
Good fin.lit.	-0.096***
	(0.030)
Risk-averse	-0.011
	(0.016)
Moved	-0.060
	(0.052)
Homeowner	-0.021
	(0.027)
Employee	0.007
	(0.024)
Self-employed	-0.010
	(0.031)
Income – Q2	0.008
	(0.039)
Income – Q3	0.008
	(0.038)
Income – Q4	0.006
	(0.039)
Income – Q5	0.030
	(0.043)
Net Wealth – Q2	0.021
	(0.035)
Net Wealth – Q3	0.041
	(0.040)
Net Wealth – Q4	0.039
	(0.040)
Net Wealth – Q5	-0.028
	(0.042)
Observations	5,081
Pseudo-R^2	0.075

Switch Drop used as dependent variable in alternative to Switch. All regression specifications include matrix **X** (dummies for time and area of residence, municipality size dummies), that are omitted due to space considerations.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Robustness: alternative measures for household loyalty, main specification

	(1)	(2)	(3)	(4)
***R**: Household-bank relationship characteristics*				
Nr. Banks	0.063***	0.063***		
	(0.017)	(0.017)		
Long-lasting relationship			-0.111***	-0.110***
			(0.022)	(0.022)
Nr. Total services	-0.036***		-0.031***	
	(0.011)		(0.012)	
Payments		-0.065**		-0.041
		(0.031)		(0.032)
Insurance		-0.033		-0.050
		(0.036)		(0.035)
Mortgage		-0.003		-0.012
		(0.024)		(0.025)
Consumer credit		-0.092***		-0.077**
		(0.034)		(0.038)
Portfolio mgmt.		-0.050**		-0.034
		(0.022)		(0.024)
Other services		0.047		0.043
		(0.043)		(0.050)
Observations	5,081	5,081	4,166	4,166
Pseudo-R^2	0.066	0.069	0.080	0.082

Exclusivity is substituted with Nr. Banks in Columns (1) to (2), and with Long-lasting relationship in Columns (3) to (4). All regression specifications include matrix **B**, **H** and **X**, here omitted due to space considerations.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Robustness: alternative measures for household loyalty, change services specification.

	(1)	(2)
***R**: Household-bank relationship characteristics*		
Nr. Banks	0.061***	
	(0.018)	
Long-lasting relationship		-0.107***
		(0.022)
Nr. Total services	-0.045***	-0.042**
	(0.016)	(0.017)
Add payments	0.071*	0.074*
	(0.040)	(0.045)
Drop payments	-0.002	0.004
	(0.027)	(0.028)
Add insurance	-0.034	-0.050
	(0.049)	(0.050)
Drop insurance	0.030	0.011
	(0.050)	(0.047)
Add mortgage	0.148***	0.174***
	(0.041)	(0.046)
Drop mortgage	0.129***	0.144***
	(0.038)	(0.042)
Add consumer credit	-0.014	-0.003
	(0.038)	(0.040)
Drop consumer credit	-0.044	-0.019
	(0.047)	(0.051)
Add portfolio mgmt.	-0.004	0.016
	(0.030)	(0.035)
Drop portfolio mgmt.	0.036	0.058*
	(0.029)	(0.031)
Add other services	-0.036	-0.024
	(0.031)	(0.033)
Drop other services	0.085	0.064
	(0.052)	(0.062)
Observations	5,081	4,166
Pseudo-R^2	0.080	0.098

Exclusivity is substituted with Nr. Banks in Column (1) and with Long-lasting relationship in Column (2). All regression specifications include matrix **B**, **H** and **X**, here omitted due to space considerations.* significant at 10%; ** significant at 5%; *** significant at 1%.

2.A. Appendix

Table A1: Description of variables

Variable	Description	Data source
Dependent variable		
Switch	Binary variable taking value 1 if between two consecutive SHIW waves a household changes its (main) bank, 0 otherwise.	SHIW
Switch New	Binary variable taking value 1 if between two consecutive SHIW waves a household changes its main bank switching to a new one with which it did not have any previous relationship, 0 otherwise.	SHIW
Switch Drop	Binary variable taking value 1 if between two consecutive SHIW waves a household changes its main bank without keeping it as a secondary bank, 0 otherwise.	SHIW
Regressors		
***R**: Household-bank relationship characteristics*		
Exclusivity	Binary variable taking value 1 if a household has only one bank, 0 otherwise.	SHIW
Nr. Total services	Categorical variable counting the total number of bank services used by a household.	SHIW
Payments	Binary variable taking value 1 if a household uses its main bank for the payment of utilities, rent and other expenses, and 0 otherwise.	SHIW
Insurance	Binary variable taking value 1 if a household uses its main bank for insurance services, and 0 otherwise.	SHIW
Mortgage	Binary variable taking value 1 if a household uses its main bank for mortgage, and 0 otherwise.	SHIW
Consumer Credit	Binary variable taking value 1 if a household uses its main bank for consumer credit or personal loans, and 0 otherwise.	SHIW
Portfolio mgmt.	Binary variable taking value 1 if a household uses its main bank for securities custody, administration and management, and 0 otherwise.	SHIW
Other services	Binary variable taking value 1 if a household uses its main bank for other services besides those described above, and 0 otherwise.	SHIW
Add [Specific service]	Binary variable taking value 1 if a household does not use the specific service in wave *t-1,* but uses it in wave *t,* and 0 otherwise.	SHIW
Drop [Specific service]	Binary variable taking value 1 if a household uses a specific service in wave *t-1,* but does not use it in wave *t,* 0 otherwise.	SHIW
Nr. Banks	Categorical variable counting the number of banks the household has relationship with (used as an alternative to the variable "exclusivity" defined above, as a measure of household's loyalty to its main bank).	SHIW

Variable	Description	Data source
Long-lasting relationship	Binary variable taking value 1 if a household has been using its main bank for more than 10 years, and 0 otherwise (used as an alternative to the variable "exclusivity "defined above, as a measure of household's loyalty to its main bank).	SHIW
H: *Household characteristics*		
Household size	Categorical variable counting the number of household members.	SHIW
Male	Binary variable taking value 1 for a male household head, 0 for female.	SHIW
Age, Age^2	Integer variables representing the age of the household head and its quadratic form.	SHIW
Married	Binary variable taking value 1 if the household head is married, and 0 otherwise.	SHIW
Medium Education, High Education	Binary variables taking value 1 for the corresponding level of education: Medium education corresponds to having completed secondary school and/or college; High education corresponds to having obtained a graduate and/or post-graduate degree. The reference category is Low education, i.e., having completed only primary education or having no education at all.	SHIW
Intermediate Financial Literacy, Good Financial Literacy	Binary variables taking value 1 for the corresponding level of financial literacy: Intermediate financial literacy corresponds to having answered correctly only one question out of 2; Good financial literacy corresponds to having answered correctly to both questions. Reference category is Low Financial Literacy, meaning having given no correct answer.	SHIW
Risk-averse	Binary variable taking value 1 if risk aversion level is 4, 0 otherwise. The risk-aversion level is obtained by means of a categorical variable representing the preferred risk profile of financial investments: 1 = High risk, high returns 2 = Reasonable risk, good returns 3 = Low risk, reasonable returns 4 = No risk, low returns	SHIW
Moved	Binary variable taking value 1 if a household changed its residence from one municipality to another between wave *t-1* and wave *t*, and 0 otherwise.	SHIW
Homeowner	Binary variable taking value 1 if a household owns its primary residence, and 0 otherwise.	SHIW
Employee, Self-employed	Binary variables taking value 1 for household heads being in the corresponding occupational status, 0 otherwise. Reference category is "non-working position".	SHIW

Income (Net Wealth) quintiles	Binary variables taking value 1 if the household's yearly disposable income (net wealth, defined as the sum of real and financial assets net of liabilities) is within the relevant distribution quintiles, and 0 otherwise.	SHIW
B: *Bank characteristics*		
Size	Bank's total assets, in logs.	BS
Commercial, Cooperative, Savings	Binary variables taking value 1 for the corresponding bank's specialization. The reference category is Commercial bank.	BS
Listed	Binary variable taking value 1 if the bank is listed, and 0 otherwise.	BS
M&A	Dummy variable taking value 1 if the bank underwent a process of Merge & Acquisition between *t-1* and *t*, and 0 otherwise.	BS
Equity/Total assets	Variable representing the ratio between bank's equity and total assets, in percentage points.	BS
Return on Assets (ROA)	Variable representing the ratio between the bank's pre-tax profits and assets, in percentage points.	BS
X: *Background characteristics*		
Time dummies (2010, 2012)	Dummy variables taking value 1 in the relevant year, and 0 otherwise. The reference category is 2008.	SHIW
Regional dummies	Dummy variables taking value 1 for the relevant macro-region (North-West, Centre, South), and 0 otherwise. The reference category is North-East.	SHIW
Municipality size	Categorical variable representing the size of the residential municipality: 1 = less than 5,000 2 = [5,000-20,000] 3 = [20,000-50,000] 4 = [50,000-200,000] 5 = more than 200,000 The model specifications include four dummies for municipality size from 2 to 5, i.e., the reference category is 1 (municipality size less than 5,000)	SHIW

Note*: SHIW is Survey on Household Income and Wealth; BS is BankScope.*

Chapter 3

Till Mortgage Do Us Part: Refinancing Costs and Competition in the Mortgage Market[41]

Abstract

We study how a legislation change that exogenously reduced refinancing costs for mortgages had an impact on bank-switching behavior of the mortgage holders and on the competition in the mortgage market. Using household-level micro-data from Italy, we find that prior to the reform, when mortgages entailed particularly large refinancing costs, the mortgage clients were "locked in" with their bank, but the reform has effectively "broken the chains". Dissecting the result, we find that this surge in their mobility was confined to more educated individuals and less competitive markets. We further show that the introduction of the new Law not only affected the behavior of extant mortgage holders, but also made taking out a mortgage a strong motivation to switch. This evidence suggests that the liberalization made the banks use the mortgages more competitively as a tool to attract new clients, but it also indicates that the increased flexibility in the market made clients less inert.

Keywords: mortgage, refinancing fee, switching costs, natural experiment, difference-in-differences

JEL Classification: G21; D14

[41] A special thanks to Giuseppe Ilardi at Bank of Italy who provided the regression estimates based on the restricted SHIW dataset.

3.1 Introduction

In economic theory, the conventional wisdom holds that switching costs are detrimental to competition (see, e.g., Klemperer, 1995). When a rational mortgage holder faces switching costs, as reflected in the cost of refinancing a loan, he will not switch to the bank offering him a "better deal" if these costs outweigh the terms differential between the two banks. The incumbent bank can exploit this situation to maintain unfavorable loan terms (i.e., to extract rents) without concern of losing the client. This "lock in" effect should, however, weaken as the refinancing costs decrease. In a nutshell, if the theory holds, the fall of such costs to a sufficiently low level should spark bank switching among the mortgage clients (in the presence of better alternatives).

Despite this straightforward theoretical prediction, to the best of our knowledge this hypothesis has not been empirically tested yet. Most of the literature on switching costs is quite general and theoretical in nature (see Klemperer, 1995, and Farrell and Klemperer, 2005, for excellent reviews of the literature). The main challenge to the empirical investigation of switching costs is related to the fact that they are typically not directly observable (Shy, 2002). Instead, the economists must infer their magnitude from clients' observed switching behavior (Dubé et al., 2008). Such analysis requires detailed micro-level data, which are very rarely available (Kim et al., 2003).

To overcome these challenges, this paper relies on a unique dataset and an empirical strategy exploiting an exogenous shock to refinancing costs in the mortgage market. More specifically, we study a legal change in Italy in early 2007 that exogenously reduced refinancing costs for mortgages – a bank service that entailed particularly large switching costs a priori – with the aim of increasing flexibility in the mortgage market. The reform, commonly referred to as the "Bersani Law", enabled the bank borrowers to prepay the loan at their current bank or change their loan provider without requiring authorization from the initial lender and without any (or at significantly reduced) charges. The main cost reduction was introduced by cutting early termination penalties imposed by the banks (prepayment fee) and mortgage registration and notary fees. We explore this natural experiment using a difference-in-differences methodology that compares switching propensities of a treated group of bank retail clients with a control group. "Treated" clients have a mortgage that is still outstanding around the change in the law. We compare the treated clients' switching propensities with those of the control group, composed of bank clients without a mortgage, controlling for a rich set of clients' and banks' observable characteristics. Importantly

for our purpose, we are able to identify a causal relationship between the reduction of refinancing costs and the hike in switching among the mortgage clients, since the legal change is exogenous to both client and bank idiosyncratic developments. The second key strength of our empirical strategy stems from a rich, representative household survey dataset, provided by the Bank of Italy, complemented with Bankscope information on banks, which allows us to control for a wide set of household and bank characteristics, as well as features of their relationship.

Our main findings can be summarized as follows. First, we document that, prior to the introduction of the Bersani Law, the mortgage clients had a significantly (23%) lower share of switchers than comparable clients without a mortgage, but the change in the law sparked mortgage holders' propensity to switch to the rate 25% higher than among the clients in the control group. This result suggests that the mortgages produced a "lock in" for the clients, but the reform has effectively "broken the chains". Dissecting this result, we show that a client's responsiveness to the reform is defined by the client's sophistication (as proxied by his educational attainment) and market competition in the area of client's residence (as proxied by the Herfindahl index). First, we find that the effect of the legislation is confined to more educated individuals. The results have the important policy implication that the sophistication of bank clients is instrumental to the effectiveness of policy that aims at enhancing clients' mobility through a reduction in refinancing costs. Next, we document that the Bersani Law prompted switching of the mortgage holders only in the less competitive environments, which indicates that in such markets the households initially held less affordable mortgages. We further show that the reform not only altered the switching behavior of the extant mortgage holders, but also made taking out a mortgage a strong motivation to switch. This evidence of "mortgage shopping" supports the notion of Bennett et al. (2001) that regulation in the US mortgage market made mortgage origination more competitive and increased the financial awareness of homeowners. Taken together, our results suggest that mortgage refinancing costs play an important role in retail banking markets, affecting behavior of both banks and their clients.

The rest of the paper is organized as follows: Section 2 surveys the related literature; Section 3 describes the Italian mortgage market and the new Law passed in 2007; Section 4 introduces our data and variables; Section 5 outlines our methodological approach; Section 6 presents our results and the associated robustness checks, and Section 7 concludes.

3.2 Literature Review

Overall, as Zinman (2014) puts it, "…household debt is a neglected topic within the relatively neglected sub-field of household finance". In particular, since the mortgage loans constitute the predominant type of financial liabilities of households (Guiso and Sodini, 2012; Brown and Hoffmann, 2013; ECB, 2013) and the bulk of bank loans in developed economies (Beck et al., 2012), there is surprisingly little empirical work on the dynamics of mortgage relationships.[42] To the best of our knowledge, there is little (if any) empirical evidence on switching by bank retail borrowers.

The bulk of the literature on retail client switching investigates switching by the depositors (i.e., the banks' creditors), focusing on (perceived) bank distress as a driver of deposit withdrawals (Diamond and Dybvig, 2013 and Iyer et al., 2013). In a recent contribution, using Swiss survey data, Brown et al. (2013) investigate to which extent switching costs mitigate a run-off from a distressed bank. The bank borrowers are expected to be less concerned about the bank's soundness, whereas their main motivation for switching banks are the offered loan terms.

Literature in corporate lending investigates, e.g., the motivation of a firm for switching a bank (Gopalan, 2011), the impact of bank mergers on the small firms' decision to stay, switch, or drop a bank (Degryse et al., 2011), and loan conditions when firms switch banks (Ioannidou and Ongena, 2010). Using Bolivian credit registry data, Ioannidou and Ongena (2010) document the bank practice of luring the corporate clients with competitive loan terms compared to those offered by their current bank – only to spike up the interest rate soon after the switch. However, for a switch to occur in that concept, the offered interest rate discount has to outweigh the switching costs a client faces. We contribute to this literature by directly investigating the role played by switching costs in the credit markets.

Our work is also closely related to the literature on industrial organization, which studies switching costs in the context of entry deterrence, market power, and rent extraction (see, e.g., Klemperer, 1995, for an excellent summary of the pioneering theoretical work, and Barone et al., 2011, for a more recent literature review). Although the nature of switching costs largely varies

[42] Brown and Hoffmann (2013), for example, compare mortgage and non-mortgage relations of Swiss households using survey data, and document systematic differences between the two types of relationships.

across different industries, one common denominator is that switching costs in general are very difficult to measure. Kim et al. (2013), for example, infer their significance in Norwegian credit markets by analysing aggregated data on interest rates and market shares. By exploiting an exogenous source of variation in switching costs and unique micro-level data, we are able to investigate empirically the role that switching costs play in the mortgage market.

We also contribute to the literature on household sophistication. A large body of work documents that poorer education (Campbell, 2006; Calvet et al., 2007 and 2009), financial literacy (see Lusardi and Mitchell, 2014), and cognitive abilities (e.g., Christelis et al., 2010, and Grinblatt et al., 2011) are all positively correlated with sub-optimal financial behavior. These financial decisions range from inefficient saving (Jappelli and Padula, 2013), a lack of retirement planning (van Rooij et al., 2012), more costly financial instruments (Hastings and Mitchell, 2011, and Lusardi and Tufano, 2009), and a lack of portfolio diversification (Guiso and Jappelli, 2009) to reluctance to hold stocks (van de Rooij et al., 2011), inertia in stock market participation and trading (Bilias et al., 2010), and sluggish mortgage refinancing (Campbell, 2006).[43] Cole et al. (forthcoming) document that education not only increases the equity holdings, but also reduces the probability of financial hardship (declaring bankruptcy, facing a foreclosure or becoming delinquent on a loan). We build on this body of work by investigating the heterogeneity of responsiveness to a policy that made switching more affordable for mortgage holders across households of different levels of education.

3.3 Institutional Background

The collapse in the subprime mortgage market in the US triggered a financial crisis in 2007 that subsequently spilled over to other countries. In Italy, however, this contagion was limited. The Italian banks were characterized by a traditional banking model that relied on stable bank financing and a rigorous assessment of the borrowers' ability to pay. Prudence was the most salient in retail lending (De Bonis et al., 2012). As a result of such practices, and of strict housing credit regulations, typical loan-to-value ratios on mortgages in 2007 were among the lowest in Europe,

[43] Campbell (2006) reports that one of the most widespread financial mistakes of US households is failure to refinance a mortgage when it becomes profitable.

as was the share of the troubled loans (IMF, 2013). Furthermore, Italian mortgage markets were smaller (relative to the GDP) than those in other EU countries (Hess and Holzhausen, 2008).

The Law 40/2007, commonly referred to as the "Bersani Law" after Pier Luigi Bersani, the minister who proposed it, introduced a set of liberalization measures in several sectors in Italy, aimed to promote consumer protection, enhance competition, and increase the overall economic activity.[44] The most relevant measure concerning the market for mortgage loans was a substantial reduction of the mortgage refinancing costs, mainly through a cut of the mortgage registration and notary fees and especially the early repayment fees imposed by the banks. Prior to the Bersani Law, the magnitude of these costs strongly discouraged mortgage holders to switch to another bank. Banks used to charge a penalty of at least 1% of the value of the loan for early mortgage termination. Furthermore, since the old mortgage had to be cancelled and replaced by a new contract, the procedure involved additional costs, such as registration taxes and notary fees. As a result, the overall cost of changing a mortgage provider was at least 3% of the mortgage amount.

One of the main provisions introduced by the reform was the facilitation of the mortgage subrogation (i.e., "portability"), where a mortgage is transferred to another bank by the will of the debtor, with the declared intent of increasing the mobility of the mortgage holders.[45] To exercise the mortgage subrogation, several conditions have to be met, the most important one being that the amount of the loan cannot be changed. On the other hand, the reform now allowed the level and type of the interest rate (e.g., fixed vs. floating) as well as the maturity of the loan to be altered, with fully transferable collateral and without losing the tax benefits that the initial mortgage might have entailed, without (or at significantly reduced) costs.[46] The current bank was not entitled to

[44] Law 40/2007 was passed on 2 April 2007, converting the corresponding decree that had been issued on January 31st of the same year. In what follows, "Bersani Law" and "Bersani Decree" are used interchangeably.

[45] The mechanism of subrogation was already provided by the Italian Law (see art. 1202 of the Civil Code). In practice, however, this article was inapplicable to the banking relationships, due to certain clauses banks commonly included in the contracts prior to the introduction of the Bersani Law.

[46] Specifically, the new Law introduced the following set of thresholds for the prepayment penalties:

a) All payment penalties were abolished for the mortgage loans granted from 3 April 2007 or first home mortgages granted after 2 February 2007.
b) For mortgages originated after 2001, a fee of up to 1.9% of principal outstanding can be imposed.
c) The maximum applicable penalty equal to 0.5% of the principal outstanding is set for the mortgages originated prior to 2001.
d) A further reduction of the penalties was mandated for loans maturing in 3 (2) years, for which the fees are cut to 0.2% (no fee), respectively.

oppose the households' choice. The new legislation was closely followed by the media and, not surprisingly, warmly welcomed by the households, while fiercely opposed by the banks.

In sum, the Bersani Law made mortgage prepayment and/or refinancing substantially simpler and cheaper, allowing the households to exercise full mortgage refinancing at reduced cost, and eventually at no cost at all. The Italian mortgage market thus became similar to the US and Danish markets, where the prepayment penalties are set to zero. The extent to which the Bersani Law was effective in promoting competition in the mortgage market via an increase in mobility of mortgage holders, which is the question we address in this study, remains not empirically verified to date.

3.4 Data and Variables

3.4.1 Dataset

Our main data source is the Survey on Household Income and Wealth (SHIW), a biannual household survey set up by the Bank of Italy. The interviewees, half of whom are rotating panel units, form a population-representative sample in a given year. The basic statistical unit of the survey is a household, which includes all people who normally reside in the dwelling and have contributed at least part of their income. Each household reports a household head, defined as the person primarily responsible for the household budget, who answers the bulk of the questions on behalf of his/her household members.[47] The sample used in the recent surveys consists of about 8,000 households (24,000 individuals), distributed across about 300 Italian municipalities. The scope of the survey has grown over the years, with a questionnaire comprising about 200 questions. In addition to the demographic and socio-economic details, the survey now provides a wealth of information on different aspects of economic and financial behavior, including the choice of the financial intermediaries and financial services used. What is important for our purpose is that the panel component of the survey, combined with the household's bank identifier, enables us to infer whether a household changed its (main) bank between two survey waves. Using the same identifier, we are able to supplement the dataset with the bank-level information from Bankscope (BS) – a source collecting extensive bank data from their balance sheets and income statements, as well as more general information, such as the bank history and the specialization.

[47] See Bank of Italy (2012) for more information on the sampling and interviewing methods employed in the SHIW.

3.4.2 Variable definitions

This section describes the variables used in our empirical analysis. The variables central to the analysis are constructed from a SHIW module that collects information on household-bank relationshis. The households are asked to report the bank(s) they use, to single out the one they use most often (their main bank), and to list the services used with the bank. Households may indicate one or more services among the following: payments of utilities, rent, or other expenses; mortgage; consumer credit and personal loans; securities custody, administration, and management; and insurance.

Exploiting the panel component of the SHIW, we follow the households over time and construct our dependent variable *Switch*. It is a binary variable being 1 in *t* if household *i* changed its main bank between wave *t-1* and *t*, and 0 otherwise.[48] We also build a control variable for exclusivity of a bank relationship *The only bank used* as a dummy being 1 if a household has dealings with one bank only, and 0 otherwise.

In line with the literature on household finance, we control for a wide set of standard socio-economic and demographic characteristics that may affect the households' economic decisions. The economic condition of a household is captured by *Income* and *Net wealth*, both in the form of quintiles. We also control for the household size by means of a count variable, for the household head's age in both linear and quadratic terms, and for gender and marital status by means of two dummies for *Male* and *Married*, respectively. Education is controlled for with two dummies for the highest educational attainment of the household head, these being secondary school or college (*Medium education*) and graduate or post-graduate level (*High education*). The SHIW also provides a self-reported measure of risk aversion, as the household head is asked to indicate the preferred investment profile among four types, ranging from 1 (high risk, high returns) to 4 (no risk, low returns). We use a dummy taking the value of 1 if the preferred investment profile is the fourth (*Risk-averse*). We also control for the homeownership by means of a dummy for owning the residential house (*Homeowner*) and for household head's main professional occupation,

[48] To account for a possible bank consolidation between two SHIW interviews, we adopt a conservative definition of switching where we do not count as a switch if a household turns to a bank that has been involved in a merger or an acquisition with the household's previous bank. We do not count "forced" switches either, where a household had to switch simply because his previous bank ceased to exist.

including dummies for being *Employee* or *Self-employed*, thus having the "non-working" as the reference category. We also control for the bank features such as its specialization, performance, size, and recent involvement in a merger or an acquisition. Bank specialization is captured by means of two dummies for the *Cooperative* or *Savings* bank, with the commercial banks being the reference category. We proxy the bank profitability by Return on Assets (*ROA*), whereas we proxy the bank size by the bank total assets (*Bank Size*). We also include a dummy for recent M&A involvement (*M&A*), this being 1 if the bank was involved in M&A process between *t-1* and *t*, and 0 otherwise.

For a detailed definition of all the variables used in the analysis, see Table A1.

3.4.3 Descriptive statistics

Table 1 lists the variables used in this study. We report the descriptive statistics at the household level for the observations that we used to estimate our main empirical model, as in equation (1). These observations are drawn from the SHIW biannual survey from 2004 to 2008.[49] Panel A presents the statistics for controls used in our difference-in-differences estimation, thus including the observations from 2004 and 2006.[50] Panel B provides statistics for our dependent variable and the main variables of interest. Over the three waves, there are 2,021 unique households in our estimation sample. The sample is an unbalanced panel for a total of 2,898 observations.[51]

The average age of the household heads is around 54 years, about 70% are males, 72% are married, and 68% have a college degree, while 14% obtained an advanced academic degree. The median household is composed of 3 people. Median household income is around €38,000, the median net wealth is €242,000, and 75% of households own their house. About 42% of the household heads work as employees, 18% are self-employed, and the rest are not working. The majority of the households use only one bank and no more than one bank service in addition to a

[49] We drop the households in which the household head is aged over 91 or below 19, as well as the households that report negative total consumption or possess neither financial nor real assets.
[50] More on the choice of timing of the regressors follows.
[51] For consistency, in Panel A, we present the statistics for 2,291 observations used in the econometric estimation of equation (1) with a full set of controls. The statistics for the initial 2,898 observations are largely similar.

bank account. Overall, 87% of households use a commercial bank (as their main bank), 7% use a cooperative bank, and 6% use a savings bank. There are 83 banks used by the households in our estimation sample, which hold 94% of total assets of all commercial, cooperative, and savings banks in the Italian market.

3.5 Methodology

In our main econometric analysis, we examine the effect of a legal change using a difference-in-differences (DiD) approach. This methodology relies on measuring the differential effect of the event on a group that is affected by the legal change, which we refer to as "the treated group", and a group that is not directly affected by it, which is "the control group". Our "treatment" is the Bersani Law that focused on mortgages, thus our treated group is the households that have a mortgage that is still outstanding around the time of the change in the law, and the control group is the households that do not hold a mortgage.

Figure 1 illustrates the timeline that we use in our methodological approach. The notches on the axes represent the timing of our biannual observations and the reform we analyze in this study. The Bersani Law came into effect in early 2007, between two SHIW waves; thus, we can compare household's bank switching propensity before and after the legal change. In our empirical framework, we face at least two conceptual limitations. The first is related to the nature of our dependent variable, *Switch.* As we infer switching from bank(s) a household declared to use in survey waves *t-1* and *t*, we are unable to observe the exact timing of a switch, but we can only identify whether switching took place at some point between the two interviews. To address this peculiarity of the data, we use lagged regressors. The second limitation concerns the time span to be used in our DiD estimation. In each period, a household may choose to take out a mortgage and/or switch bank, which confounds our identification strategy in a setting with more than two periods. For this reason, we initially restrict our analysis to a two-period DiD estimation.[52] We relax this restriction in the robustness analysis, where we estimate a fixed-effects model.

[52] For clarification, looking at Figure 1, it is clear that if we included observations from 2010 to our analysis, we would include mortgages that may have been taken out after 2007, i.e., after the Bersani Law was introduced. This setting would be inappropriate for a DiD estimation of the impact of the reform, as refinancing costs for these new mortgages are set to zero since their very origination. A two-period DiD also enables us to avoid the main concerns raised by Bertrand et al. (2004) on the serial correlation of the standard errors, which often plagues the DiD analysis. The

The crucial element in any DiD specification is a viability of a "common trend assumption". This assumption implies that the treated and the control group would have evolved similarly if there had not been a legal change, i.e., the non-mortgage holders are a valid control group to assess the counterfactual of what would be the trend for the mortgage holders if the Bersani Law had not been introduced. The evolution in behavior of the treated and the control group prior to the event, as depicted in Figure 2, provides a reasonably reliable indicator. Figure 2 plots the shares of switchers among the mortgage holders (households that always report having a mortgage) vs. the non-mortgage holders (households that never report having a mortgage) from 2004-2010. The nods correspond to the statistics computed biannually, connected by the lines for ease of the visual representation. In support of our identification strategy, prior to the reform in 2007 the share of switchers among the mortgage holders and non-mortgage holders has been evolving close to parallel, i.e., sharing a "common trend". This figure also provides support to the notion that the Bersani Law had a strong impact on the switching behavior of the mortgage holders. Namely, prior to the reform, they were significantly less likely to switch their bank compared to other bank clients, whereas they became the prime switchers following 2007, and this "inversion" effect is large.

To evaluate this effect more rigorously, we estimate the following regression equation:

$$y_{it} = \alpha_0 + \alpha_1 \mathbf{Treated}_{it-1} + \alpha_2 \mathbf{Post}_t + \alpha_3 (\mathbf{Treated}_{it-1} \times \mathbf{Post}_t) + \mathbf{X}_{it-1}\theta + \varepsilon_{it} \quad (1),$$

where y_{it} is our dependent variable Switch. The main explanatory variable of interest is the interaction term $\mathbf{Treated}_{it-1} \times \mathbf{Post}_t$ where $\mathbf{Treated}_{it-1}$ is a binary variable taking value 1 if household *i* has a mortgage in *t-1* and 0 otherwise and $\mathbf{Post}_t$ is a binary variable taking the value of 1 if the year falls after the introduction of the Bersani Law, and 0 otherwise, $\mathbf{X}_{it-1}$ is a vector of control variables, and ε_{it} is the error term. The model is estimated on a restricted sample of 2004-2008, to compare the switching right before and after the legal change (i.e., switching between 2004 and 2006 compared to switching between 2006 and 2008). If the Bersani Law had the predicted effect, α_3 (our DiD estimator) is expected to be statistically significant and positive.

alternative method the authors propose is to compare pre- and post-reform averages (as, e.g., in Cerqueiro et al., 2014), but since our dependent variable is a dummy measuring a change of the bank used, this in inapplicable in our study.

Specifically, α_3 measures the differential effect of the change in the law across households that held a mortgage around the time the Bersani Law was introduced and those who did not.[53]

So far, our framework focused on the mortgage loans outstanding around the change in the law, i.e., the extant mortgages. Our second empirical model aims to assess the effect of the reform on new mortgage issues, i.e., the mortgages taken out between two waves of interviews. The economic rationale is the following. The reform is likely to have affected the incentives of both banks and their retail clients. Banks, now operating in the mortgage market with substantially lower switching costs, have to compete more aggressively to attract new mortgage buyers. On the other hand, the households taking out a mortgage are less reluctant to do so at another bank (increasing the household's mobility), since they are aware that newly ensured flexibility in the market will enable them to switch again should they wish. In other words, the households can now afford to make a mistake in choosing a bank, since they can change their mind anytime in the future at no penalty. As a result, we expect the households taking out a mortgage to have become less inert, i.e., more likely to switch banks for that purpose, than those taking out a mortgage prior to the reform. We test this empirically by estimating the following regression equation, splitting the sample around the date of entry into force of the Bersani Law, i.e., in the subsamples prior to and after 2007:

$$y_{it} = \beta_0 + \beta_1 \boldsymbol{Add\ Mortgage}_{it} + \mathbf{X}_{it-1}\,\theta + \varepsilon_{it} \qquad (2),$$

where y_{it} is our dependent variable *Switch*. $\boldsymbol{Add\ Mortgage}_{it}$ indicates the households that did not hold a mortgage with their bank in *t-1* and they take it out in *t*, **X** is a vector of control variables (lagged one period) and ε_{it} is the error term. If the sharp reduction in switching costs induced by the reform had the predicted effect, we expect β_1 to be positive and statistically significant in the period following the legislative change, whereas the association should be weaker (if at all) prior to the reform.

[53] Limited data on loan terms, however, does not allow us to observe the mortgage renegotiations with the original lender. To the extent that the bank acts to keep the customer, and some mortgages may get refinanced at the current bank, our analysis actually captures a lower bound of the refinancing volume.

3.6 Results

3.6.1 Extant Mortgage Loans

The univariate analysis of our sample provides preliminary evidence of the effect the "Bersani Law" had on the switching behavior of the bank retail clients. Table 2 displays the share of switchers for the treated group (mortgage holders) and the control group (other bank retail clients), as well as differences of means test. Prior to the reform, significantly fewer households in the treated group had switched, compared to the share of switchers in the control group, corroborating anecdotal evidence of high switching costs for the mortgage holders. The magnitude of this wedge is economically important and statistically significant at 10% confidence level. In turn, following the change in the law, the treated group experienced a much sharper increase in the share of switchers compared to the control group, resulting in a reversed wedge, i.e., a larger share of switchers among the mortgage holders than among the clients without a mortgage. Again, the difference between the two groups is statistically significant and economically important. In a nutshell, the univariate analysis shows that prior to the reform there had been 7.5% fewer switchers among the mortgage holders than among the bank clients without a mortgage, whereas after the reform the mortgage holders switched about 6% more than clients in the control group. When interpreting Table 2, however, one should bear in mind that the statistics do not account for the potential heterogeneity across the households, banks, and time.

To allow for these factors, we carry out a multivariate analysis using a difference-in-differences estimation, as explained in Section 5. The estimates in Table 3 correspond to the coefficients obtained by an ordinary least squares (OLS) estimation of equation (1), varying the controls included in the estimation.[54] All coefficients are estimated using the sample weights, with the robust standard errors clustered at the province level.[55] In the first column, we present a model where we estimate the "baseline" DiD, i.e., a difference-in-differences model without the control variables. The results are in line with the statistics in Table 2 and the visual representation in Figure

[54] OLS is employed for ease of interpretation of the reported results. Furthermore, the interaction terms in non-linear models may be biased and imprecisely estimated (see Ai and Norton, 2003). We re-estimated our regressions using a probit model, obtaining largely comparable results.

[55] Our main results are robust to clustering of the standard errors at fewer clusters with regard to the provinces (i.e., clustering at the level of regions and macro-regions), as well as to clustering at the bank level.

2. Most importantly, our DiD coefficient estimate (*Treated x Post*) is large in magnitude and strongly significant statistically. A simple interpretation of the results in column (1) is that the increase from 2006 to 2008 in the proportion of switchers among the mortgage holders is 15% higher than the increase in the share of switchers in the control group for the same period. This result, however, may be driven by the differences (in the cross-section and over time) in the socio-economic features of the clients in the treated group compared to the clients in the control group, of the banks they are using and/or the regions they reside in, for example. To obtain a DiD estimate net of such potentially confounding factors, in columns (2)-(4) we add various controls to the base model. As we increase the number of controls, our DiD coefficient increases in magnitude remaining statistically significant at 1% level. Column (2) presents the results for the model that controls only for the region fixed effects and for the population size in the municipality of the household residence. All coefficient estimates are almost identical to those in column (1). In column (3), we add household controls to the model which the household finance literature relates to their financial choices: education level (dummies for medium-level and higher education), household size, age (linear and squared), gender (male dummy), marital status (married dummy), risk aversion (dummy for being risk-averse), homeownership (dummy for owning the property), employment status (dummies for employee and self-employed) and income and wealth (both in the form of quintiles). We also control for exclusivity of the relationship with the bank (the dummy being 1 if the bank is the only one a households uses). The estimated wedge between the treated and the control groups becomes larger in magnitude both before (*Treated*) and after the reform (*Treated*Post*), and more precisely estimated compared to column (2). In column (4), we also add the controls for the bank characteristics, such as its specialization (dummies for being a cooperative or savings bank, with the commercial banks being the reference category), profitability (as captured by return on assets), size (as proxied by bank size), and recent organizational restructuring (the dummy being 1 if a household's initial bank was recently involved in an M&A process). In this "full" model, we document further increase in magnitude for both treatment dummy (wedge between the two groups right before the reform) and DiD estimate (the same wedge following the reform). Controlling for a rich set of household characteristics, bank features, and exclusivity of their relationship, as well as for the region fixed effects and municipality size, we can infer that a mortgage holder was around 23% less likely to switch his/her bank than a comparable household in the control group preceding the reform, whereas after the introduction of the Bersani Law the

likelihood of switching was about 25% higher for the mortgage holders than for the households without a mortgage. One should also note that the dummy *Post* becomes insignificant after the household controls are included in column (3), which suggests that once we account for the change in the household characteristics between 2006 and 2008 (such as employment status and economic condition, for example), we find no increase in the switching propensity among the clients in our control group (i.e., the households without a mortgage). Based on the results presented in Table 3, we can argue a causal effect of the Bersani Law to the hike in share of mortgage holders who switch bank, and thus the effectiveness in meeting the legislator's goal to increase their mobility.[56]

The Role of Household Sophistication:

To dissect this finding, we first split the sample according to the household sophistication. We argue that for the mortgage holders to respond (in a timely manner) to the changed market circumstances two conditions must be met. First, they must learn and understand the content of the new Law and the implications for the dynamics of their relationship with a bank. Second, they must be able to compare the competing offers across banks and choose the most suitable one. Both tasks are very likely to depend on the household sophistication, which we proxy for by the household head's level of education. We re-estimate the equation (1) for the subsamples of households whose head obtained at least a secondary school diploma (medium education level in Italy) and those with a lower level of education. The results for the two subsamples are presented in Table 4, panels A and B, respectively. It is apparent that the findings in Table 3 are confined to the pool of better-educated individuals and, thus, that the household sophistication drives the results therein. This finding is particularly worrying for the policy makers, as the majority of households that take out a mortgage lack knowledge of basic financial concepts (Lusardi and Tufano, 2009). These households also seem more likely to have inappropriate mortgage terms in the first place, and subsequently to be in need of having their loan arrangement altered.[57] It has also been documented

[56] In Table 3, we do not condition on still having a mortgage in *t*, which would constrain our analysis to the mortgage refinancing alone. As the reform cut the prepayment fees in addition to the costs of changing the mortgage lender, conditioning only on having a mortgage in *t-1* allows us also to include the mortgage prepayments. As a narrower specification, we replicate Table 3 conditioning on having a mortgage in both *t-1* and *t*. The results remain largely unaltered and are reported in Table A2 in the Appendix.

[57] For example, Moore (2003) reports that, in the US, the victims to predatory lending are less likely to understand basic financial concepts, suggesting that they were not aware of the cost of their mortgage loans. Furthermore, Mayer

that less educated individuals have more difficulties recalling the terms of their mortgage (Bucks and Pence, 2008) and self-report implausibly low mortgage rates (Campbell, 2006). Using the US data from the recent financial meltdown, Gerardi et al. (2010) find that a low numerical ability of the households was a contributing factor to the massive mortgage delinquencies and foreclosures. Devlin (2002) reports that less financially savvy households choose their banks primarily based on convenience and referral, whereas for the financially sophisticated ones the product quality and price are more important factors. Along the same lines, Brown and Hoffmann (2013) document that the financially sophisticated borrowers are less likely to establish a mortgage relationship based on geographical proximity. However, we are unable to disentangle whether the documented role of sophistication in our findings is to be ascribed to lower importance of the intrinsic product features (price, fees), reduced attention (i.e., insufficient information acquired), lack of information processing skills (i.e., limited understanding of the information), or inertia (i.e., delayed responsiveness to information acquired) among the less educated mortgage holders. Yet, our findings certainly support the rich body of literature that relates various measures of household sophistication (education, financial literacy, and cognitive abilities) to the sub-optimal financial behavior (see, e.g., Campbell, 2006; Calvet et al., 2007 and 2009; Lusardi and Mitchell, 2014; Christelis et al., 2010; and Andersen et al., 2014).[58]

The Role of Competition:

Next, we investigate the role of competition in the households' responsiveness to the Bersani Law. The effect of competition is not unambiguous a priori. On the one hand, low competition implies fewer (attractive) outside opportunities, which should make the households less responsive to the facilitated portability of a mortgage ("availability of substitutes" argument). On the other hand, the households in less competitive environments may have unfavorable mortgage conditions in the first place, and may therefore be more likely to seek to refinance them ("initial condition" argument). Therefore, ex ante, it is difficult to sign the effect of competition in

et al. (2013) report that, in the late 1990s and early 2000s, banks in the US also used prepayment fees in a predatory manner.

[58] Less sophisticated clients may not be responsive to the Bersani Law simply because they cannot obtain a mortgage on favorable terms due to their lower credit quality. Although we cannot fully rule this out, a very low percentage of the households in our sample who reported having been rejected for a mortgage application or having been discouraged from applying for a loan because they thought they would be turned down provides a reasonable indicator that this alternative explanation is not confounding our analysis.

our context. We answer this question empirically by splitting the sample according to the bank competition in the market, as proxied by the Herfindahl index computed from the number of ATMs of banks operating in the province of the household residence. Panel A and Panel B of Table 5 report the results for the low and high level of bank competition, respectively. Our main findings are confirmed only for the households living in the provinces with less fierce bank competition, providing evidence in support of the "initial condition" argument, i.e., that these households held less affordable mortgages in the first place.

An alternative explanation would be that, ceteris paribus, high competition equipped the households with significant bargaining power to renegotiate a mortgage with their initial bank. According to this argument, in such environments the Bersani Law had little or no effect on refinancing with an outside bank (i.e., switching to transfer a mortgage) – as is supported by Panel B.[59]

Robustness Checks:

First, in order to test the robustness of our identification strategy, we perform a simple placebo test. Specifically, we analyze whether the reform had an effect on the households holding a consumer loan, as market conditions for this type of liabilities should not have been directly affected by the Bersani Law. That is, we re-estimate the model as in Table 3, specifying as treated the households holding a consumer and/or personal loan, instead of those with a mortgage.[60] The results are reported in Table 6. In support to our identification strategy, the DiD estimate is low in magnitude and not statistically significant.

Second, to address the heterogeneity concerns in the specification in equation (1), we estimate a fixed effects model of the form:

$$y_{it} = \alpha_i + \Upsilon_t + \beta\,(\mathbf{Treated}_i \times \mathbf{Post}_t) + \mathbf{X}_{it-1}\,\theta + \varepsilon_{it} \quad (3),$$

[59] Since we cannot observe the mortgage renegotiations with the original bank, we cannot investigate this issue further. We can only gauge the mortgage refinancing if it coincides with the bank switching, meaning a household refinances a mortgage with a bank that is different from its original lender.

[60] So as not to confound the treated and control groups, we drop from the sample all households that also hold a mortgage in addition to a personal loan. In doing so, we lose very few of the treated observations, since few households in our sample hold both a consumer loan and a mortgage with the bank.

where y_{it} is our dependent variable *Switch*. The main explanatory variable of interest is the interaction term $\mathbf{Treated}_i \times \mathbf{Post}_t$ where $\mathbf{Treated}_i$ is a binary variable taking value 1 if household *i* has a mortgage in *t-1* and *t* and 0 if it reports not having a mortgage in either of the two periods and $\mathbf{Post}_t$ is a binary variable taking the value of 1 if the year falls after the introduction of the Bersani Law, and 0 otherwise; $\mathbf{X}_{it-1}$ is a vector of control variables, and ε_{it} is the error term. The specification includes the household fixed effects (α_i) and the year fixed effects (Υ_t) to narrow down the analysis to *within* variation (where each household *de facto* becomes its own control group).[61] As in equation (1), our DiD estimator (β) is expected to be statistically significant and positive. The model is estimated on a sample of 2004-2012. We drop the households that took out a mortgage after the reform, as these mortgages are "younger" than the treatment. We only keep the households that are in a panel at least twice starting from 2004, i.e., we can potentially observe their switching decision at least once before the reform and once after the reform.[62]

Table 7 reports the regression estimates of equation (3) for the full sample (Panel A), and then the sample is split, based on a competition proxy in the area of the household residence (Panel B and Panel C). Despite a significant drop in the number of units with regard to a model without fixed effects, Panel A shows that our main result, reported in Table 3, is robust to controlling for household heterogeneity (to the extent that these differences are fixed over time). Panels B and C further confirm that the Bersani effect is present only in less competitive environments.

[61] *Treated* identifies the households that always report having a mortgage, whereas the control group consists of the households that never report having a mortgage. We therefore drop the households that changed their mortgage status (i.e., that took a mortgage out in *t* or paid it off between *t-1* and *t*) in order to get a "clean" DiD estimate of within-household variability conditional on the mortgage status. We do not include *Treated* and *Post* separately in the model, because the former is spanned by the household fixed effects, whereas the latter is spanned by the year fixed effects.

[62] To be included in our sample, a household has to be surveyed in the SHIW at least in 2004, 2006 and 2008, so that we can potentially observe its switching decision prior to the Bersani Law (between 2004 and 2006) and following the reform (between 2006 and 2008). This construction results in an unbalanced panel, as some households are surveyed also in 2010 and 2012.

An Alternative Driver of Switching – Change in Interest Rates:

A significant drop in the interest rates represents a possible driver of switching for the households that are bank debtors. If the interest rate charged on the mortgage loans is reduced, refinancing a mortgage becomes more attractive, which may in itself be a sufficiently strong motivaton for switching, even if the refinancing costs remain (or are perceived to be) unaltered. However, this is rather unlikely to be driving our results in Tables 3-5, since in the 2006-2008 period on which we estimate our main DiD model the mortgage rates increased, rather than decreased, as a result of the restrictive monetary policy pursued by the European Central Bank (see Figure 3). [63] If anything, the evolution of the interest rates would work against our finding of a significant effect of the Bersani Law.

3.6.2 New Mortgages

We turn to investigating the effect of the Bersani Law on the newly originated mortgages. In particular, we analyze whether the reform advanced the role that taking out a mortgage plays in a household's decision to switch its bank. Table 8 reports the results of estimating equation (2) on two subsamples – prior to the reform and following the reform. Since we want to compare the switching behavior of the households that take out a mortgage in *t* with those that do not, we drop from the sample households that already had a mortgage in *t-1*. Besides the main variable of interest, $Add\ Mortgage_{it}$, we include the household and bank controls, regional fixed effects, and municipality size dummies.[64] In the subsample following the reform, we include time dummies to capture the economy-wide time fixed effects that may affect the households' set of opportunities. We also control for the intensity of the relationship with the bank, which we proxy for by a dummy being 1 if a household uses more than a median number of services with the bank, which is one bank service in addition to a bank account. The dummy $Broad\ relationship_{it-1}$, thus identifies the households that use their bank more intensively and are likely to be more reluctant to switch.[65]

[63] The interest rates reduction started in late 2008.

[64] We do not control for risk aversion, as it is largely missing in 2004 (only a subset of respondents in that wave was asked the question), and our pre-reform subsample is already smaller than the post-reform one. This, however, does not alter our findings.

[65] Reluctance to switch may be due to time and effort needed to evaluate net gains of switching for each particular bank service, but the clients using more services may also enjoy an advantage of economies of scope with the bank, as discussed in chapter 2.

The results in Table 8 show that, prior to the reform in 2007, taking out a mortgage was not a significant factor for a household's decision to switch its bank, as captured by an insignificant coefficient on $Add\ Mortgage_{it}$, in columns (1) and (3), whereas "mortgage shopping" became widespread thereafter – column (2) and (4). More precisely, the households taking out a mortgage after the reform between *t-1* and *t* are about 14% more likely to switch their bank from *t-1* than clients who do not have a mortgage in either of the two periods.[66] Given that the share of switchers in our sample ranges from 23-33%, depending on the year, this effect is economically important and identifies the "mortgage shopping" as a strong driver of switching following the reform. This result is largely in line with Brown and Hoffmann (2013) who document that in Switzerland among the households with multiple bank relationships the mortgage relations are typically more recently established. Our findings point towards increased bank competition, as a result of a more flexible mortgage market that once provided banks with powerful means to retain their clients. The results may be also capturing a decrease in the households' inertia, as they are aware of a much lower probability of being locked in an inappropriate deal. It seems very likely that both factors are at play, but with the data at hand it is impossible to disentangle which of the two contributed more to our results. In sum, our results support the hypothesis that the Bersani Law had a strong impact on the dynamics of the household-bank relationship. Our findings are in line with Bennett et al. (2001), who argue that, in the US, combination of technological, regulatory, and structural changes made mortgage origination more competitive and efficient and the homeowners more financially conscious.

The coefficient on the breadth of the relationship has the expected negative sign, which confirms the role of switching costs arising from the cross-selling of services, as shown in chapter 2, but the effect is precisely estimated only on the post-reform subsample. We further want to investigate whether this effect is strong enough to weaken the effect of the "mortgage shopping"; thus, in Columns (3) and (4), we re-estimate the model adding the interaction of the two terms:

$Add\ Mortgage_{it}\ x\ Broad\ Relationship_{it-1}$. If a more intensive use of the bank services results in sufficiently high switching costs, it should reduce the inclination of such clients to change their

[66] To account for the difference in the sample size before the reform compared to after the reform, we perform a Chow test for the difference between the two subsamples in the coefficient on our main variable of interest – *Add Mortgage.* The test rejects the null of coefficients equivalence at 5% statistical significance.

bank if they plan to take out a mortgage and a better mortgage deal is offered elsewhere. This effect would result in a negative and statistically significant coefficient on the interacted variable. However, the coefficient estimate in column (4) turns out statistically insignificant and positive, which highlights the importance of the "mortgage shopping". Mortgage is one of the most important financial decisions households make, because of the long maturity and high debt burden; thus, the advantage of a better mortgage deal well outweighs the one-off cost associated with switching from a current bank.

A limitation of our study is that it is unclear to which extent one can assert the external validity of the findings. There could be something about the Italian mortgage market(s), or banking market as a whole, which makes it unique to the analysis with regard to the refinancing costs. However, to the best of our knowledge, this is the first attempt in the literature to investigate this topic empirically. Future studies can expand countries to verify our findings. Furthermore, the lack of more detailed loan level data does not allow us to analyze the mortgage renegotiations with the same bank. An interesting empirical question would be to which extent the clients used the increased negotiating strength, which the Bersani Law conferred on them, to push their current bank to adjust the contracted mortgage terms.

3.7 Conclusion

Switching costs can be an important distorter of competition in many markets, including banking, and have received significant attention in both academic and policy discussions. However, assessing the impact of the switching costs on client and bank behavior imposes a challenge to devise a convincing identification strategy. Furthermore, the detailed micro-level data needed for such an analysis are very rarely available. Exploiting an exogenous source of variation in mortgage refinancing costs brought forward by a legal reform in Italy, known as the Bersani Law, and a unique dataset on individual switching behavior of bank retail clients, we are able to address these challenges. We study the impact of the reform using a difference-in-differences methodology to analyze the switching behavior of clients with mortgages (bank loans directly affected by the reform, thus our treated group) and comparable clients without a mortgage (our control group). Our analysis identifies the causal effect of the Bersani Law to bank switching of the households with a mortgage by cutting high refinancing costs that served as a "lock in" for these clients. Nevertheless,

the described "success" of the Bersani Law is confined to the pool of better-educated clients, indicating the role of a client sophistication as a determining factor of responsiveness to policy. We further document that the reform prompted switching of the mortgage holders only in the less competitive environments, which suggests that in such markets the households initially held less affordable mortgages. In addition to affecting the switching behavior of extant mortgage holders, we also show that the Bersani Law made "mortgage shopping" (switching a bank when taking out a mortgage) more widespread. The latter finding indicates that the newly increased flexibility in the mortgage market increased bank competition for new clients and decreased clients' inertia.

3.8 References

Ai, C., & Norton, E.C. (2003). Interaction terms in logit and probit models. *Economics Letters*, 80(1), 123-129.

Andersen, S., Campbell, J.Y., Meisner-Nielsen, K., & Ramadorai, T. (2014). Inattention and Inertia in Household Finance: Evidence from the Danish Mortgage Market. *SSRN Working Paper*.

Bank of Italy (2012). Supplements to the Statistical Bulletin, Sample Surveys, Household Income and Wealth in 2010.

Barone, G., Felici, R., & Pagnini, M. (2011). Switching costs in local credit markets. *International Journal of Industrial Organization*, 29(6), 694-704.

Beck, T. , Büyükkarabacak, B. , Rioja, F.K., & Valev, N.T. (2012). Who Gets the Credit? And Does It Matter? Household vs. Firm Lending Across Countries. *The B.E. Journal of Macroeconomics*, 12(1), 1-46.

Bennett, P., Peach, R., & Peristiani, S. (2001). Structural Change in the Mortgage Market and the Propensity to Refinance. *Journal of Money, Credit, and Banking*, 33(4), 955-75.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-in-Differences Estimates?. *The Quarterly Journal of Economics*, 119(1), 249-275.

Bilias, Y., Georgarakos, D., & Haliassos, M. (2010). Portfolio Inertia and Stock Market Fluctuations. *Journal of Money, Credit and Banking*, 42(4), 1538-4616.

Brown, M., Guin, B., & Morkoetter, S. (2013). Switching costs, deposit insurance and deposit withdrawals from distressed banks. *Working Papers on Finance* No. 2013/19.

Brown, M., & Hoffmann, M. (2013). Mortgage relationships. *Working Papers on Finance* Nr. 2013/10.

Bucks, B.K., & Pence, K.M. (2008). Do Borrowers Know their Mortgage Terms?. *Journal of Urban Economics.*

Calvet, L.E., Campbell, J.Y & Sodini, P. (2007). Down or Out: Assessing the Welfare Costs of Household Investment Mistakes. *Journal of Political Economy*, 115(5), 707-747.

Calvet, L.E., Campbell, J.Y & Sodini, P. (2009). Fight Or Flight? Portfolio Rebalancing by Individual Investors. *The Quarterly Journal of Economics*, 124(1), 301-348.

Campbell, J. Y. (2006). Household Finance. *Journal of Finance*, 61(4), 1553-1604.

Cerqueiro, G., Ongena, S., & Roszbach, K. (forthcoming) Collateralization, Bank Loan Rates, and Monitoring. *Journal of Finance.*

Christelis, D., Jappelli, T., & Padula, M. (2010). Cognitive abilities and portfolio choice. *European Economic Review*, 54(1), 18-38.

Cole, S., Paulson, A., & Shastry, G.K. (forthcoming). Smart Money? The Effect of Education on Financial Outcomes. *Review of Financial Studies*.

Degryse, H., Masschelein, N., & Mitchell, J. (2011). Staying, Dropping, or Switching: The Impacts of Bank Mergers on Small Firms. *Review of Financial Studies*, 24(4), 1102-1140.

Devlin, J.F. (2002). Customer knowledge and choice criteria in retail banking. *Journal of Strategic Marketing*, 10(4), 273-290.

Diamond, D.W., & Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, 91(3), 401-419.

De Bonis, R., Pozzolo, A.F., & Stacchini, M. (2012). The Italian banking system: facts and interpretations, in *«Economics & Statistics Discussion Paper»,* 068/12. Università del Molise.

Dubé, J.P., Hitsch, G.J., & Rossi, P.E. (2009). Do Switching Costs Make Markets Less Competitive?. *Journal of Marketing Research*, 46(4), 435-445.

European Central Bank (2013). The Euro System Household Finance and Consumption Survey: Results from the First Wave. *Eurosystem Household Finance and Consumption Network Statistics Paper Series* No.2.

Farrell, J., & Klemperer, P. (2007). Coordination and Lock-In: Competition with Switching costs and Network Effects. in M.Armstrong and R.Porter (Eds.), Handbook of Industrial Organization.

Gerardi, K., Goette, L., & Meier, S. (2010). Financial literacy and subprime mortgage delinquency: Evidence from a survey matched to administrative data. *Federal Reserve Bank of Atlanta Working Paper* No. 2010-10.

Gopalan, R., Udell, G., & Yerramilli, V. (2011). Why do firms form new banking relationships. in *Journal of Financial and Quantitative Analysis*, 46(5), 1335-1365.

Grinblatt, M., Keloharju, M., & Linnainmaa, J. (2011). IQ and Stock Market Participation. *The Journal of Finance*, 66 (6), 2119-2164.

Guiso, L., & Jappelli, T. (2009). Financial Literacy and Portfolio Diversification. *Working Paper, Centre for Studies in Economics and Finance*, Naples, Italy.

Guiso, L., & Sodini, P. (2012). Household Finance. An emerging Field. in G. Constantinides, M. Harris & R. Stulz (Eds.), Handbook of the Economics of Finance.

Hastings, J.S., & Mitchell, O.S. (2011). How financial literacy and impatience shape retirement wealth and investment behaviors. *NBER Working Paper* No. 16740.

Hess A., & Holzhausen A. (2008). The Structure of European Mortgage Markets. *Allianz Dresdner Economic Research, Working Paper* No. 97.

Ioannidou, V., & Ongena, S. (2010). Time for a Change: Loan Conditions and Bank Behavior when Firms Switch Banks. *Journal of Finance*, 65(5), 1847-1877.

IMF (2013). Country Report No. 13/348: Italy – Technical note on the financial situation of Italian households and non-financial corporations and risk to the banking system.

Iyer, R., Puri, M., & Ryan, N. (2013). Do depositors monitor banks?. *NBER Working Paper* 19050.

Jappelli, T., & Padula, M. (2013). Investment in Financial Literacy and Saving Decisions. *Journal of Banking & Finance*, 37(8), 2779–2792.

Kim, M., Kliger, D., & Vale, B. (2003). Estimating switching costs: the case of banking. *Journal of Financial Intermediation*, 12(1), 25-56.

Klemperer, P. (1995). Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade. *Review of Economic Studies*, 62 (4), 515-539.

Lusardi, A., & Mitchell, O.S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1), 5-44.

Lusardi, A., & Tufano, P. (2009). Debt literacy, financial experiences, and overindebtedness. *NBER Working Paper* No. 14808.

Mayer, C., Piskorski, T., & Tchistyi, A. (2013). The inefficiency of refinancing: Why prepayment penalties are good for risky borrowers?. *Journal of Financial Economics*, 107, 694–714.

Moore, D. (2003). Survey of financial literacy in Washington State: Knowledge, behavior, attitudes, and experiences. *Technical Report* 03-39, Social and Economic Sciences Research Center, Washington State University.

Shy, O. (2002). A quick-and-easy method for estimating switching costs. *International Journal of Industrial Organization*, 20(1), 71-87.

van Rooij, M.C.J., Lusardi, A., & Alessie, R.J.M. (2011). Financial literacy and stock market participation. *Journal of Financial Economics,* 101(2), 449-472.

van Rooij, M.C.J., Lusardi, A., & Alessie, R.J.M. (2012). Financial Literacy, Retirement Planning and Household Wealth. *Economic Journal*, Royal Economic Society, 122(560), 449-478.

Zinman, J. (2014). Household Debt: Facts, Puzzles, Theories, and Policies. *NBER Working Paper* No. 20496.

3.9 Tables and Figures

Table 1: Descriptive statistics

The table reports descriptive statistics for variables used in the analysis. All statistics are computed at the household level using the sample weights.

Variables	Obs.	Mean	Median	Min	Max	St.Dev.
PANEL A						
Age	2,291	53.87	53	21	90	14.16
Male	2,291	0.70	1	0	1	0.46
Married	2,291	0.72	1	0	1	0.45
Medium education (college)	2,291	0.68	1	0	1	0.47
High education (>college)	2,291	0.14	0	0	1	0.34
Household size	2,291	2.69	3	1	8	1.22
Risk-averse	2,291	0.40	0	0	1	0.49
Income (€1,000)	2,291	47.12	38.37	0	922.60	48.25
Net wealth (€1,000)	2,291	389.65	242.50	-875.42	17,878.38	819.40
Homeowner	2,291	0.75	1	0	1	0.43
Employee	2,291	0.42	0	0	1	0.49
Self-employed	2,291	0.18	0	0	1	0.38
Only one bank used	2,291	0.83	1	0	1	0.38
Total number of services used with the bank	2,291	1.34	1	0	5	0.80
Commercial Bank	2,291	0.87	1	0	1	0.34
Cooperative Bank	2,291	0.07	0	0	1	0.25
Savings Bank	2,291	0.06	0	0	1	0.24
Return on Assets (ROA)	2,291	0.75	0.8	-1.74	1.27	0.25
Bank Size (in logs)	2,291	11.41	11.41	9.15	13.72	1.29
M&A	2,291	0.13	0	0	1	0.33
PANEL B						
Switch						
Pooled waves (2006-2008)	2,291	0.31	0	0	1	0.46
2006	365	0.23	0	0	1	0.42
2008	1,926	0.33	0	0	1	0.47
Treated (Having a mortgage)						
Pooled waves (2004-2006)	2,291	0.16	0	0	1	0.37
2004	365	0.13	0	0	1	0.33
2006	1,926	0.17	0	0	1	0.38
Add mortgage						
2006	755	0.08	0	0	1	0.27
2008	1635	0.05	0	0	1	0.22
2010	1966	0.05	0	0	1	0.21
2012	1900	0.07	0	0	1	0.26

Figure 1: Timeline

The line represents time. The notches represent the timing of our observations and the introduction of the New Law.

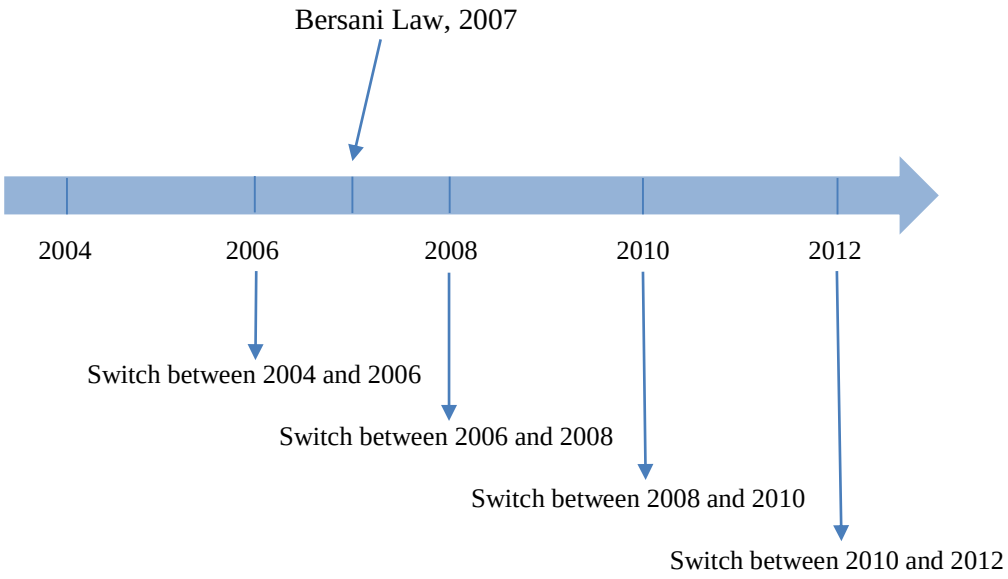


Figure 2: The graph depicts the evolution of switching propensities over the period 2004-2012 for the mortgage holders and the households without an outstanding mortgage.

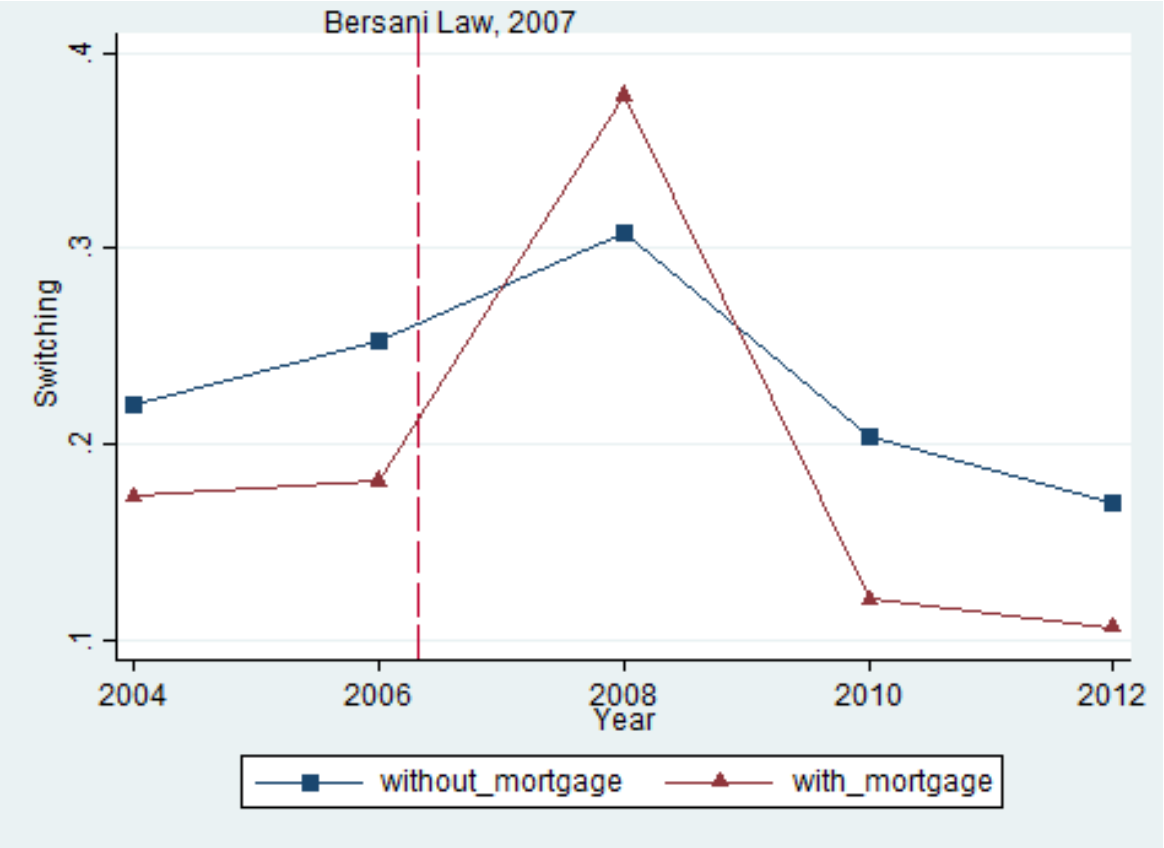


Table 2: Bersani Law and switching propensity: Comparison of means

The table displays the switching propensities (mean of the dependent variable *Switch*) between *t-1* and *t* for the *control* and *treated* groups, before and after the introduction of the Law 40/2007 on February 1st, 2007. *Control* refers to the households that did not have a mortgage on December 31st of *t-1*. *Treated* indicates that the household had a mortgage outstanding on the same date. *Before* refers to switching for *t=2006* (i.e., switching between 2004 and 2006) and *After* refers to switching for *t=2008* (i.e., switching between 2006 and 2008). Standard errors are provided in the parentheses. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Control	Treated	Difference (Treated-Control)
Switch			
Before	0.267	0.191	-0.075*
	(0.016)	(0.037)	(0.044)
After	0.34	0.40	0.059**
	(0.012)	(0.028)	(0.03)
Difference	0.073***	0.207***	
(After-Before)	(0.02)	(0.051)	

Table 3: Bersani Law and switching

The table reports the results for regressions of the form:
$y_{it} = \alpha_0 + \alpha_1 Treated_{it-1} + \alpha_2 Post_t + \alpha_3 (Treated_{it-1} \times Post_t) + X_{it-1}\theta + \varepsilon_{it}$, where i indexes households, t indexes year, and α_3 is the difference-in-differences estimate corresponding to the coefficient on the interaction term of $Treated$ and $Post$. $Treated_{it-1}$ indicates the households that reported having a mortgage in *t-1*. $Post_t$ indicates the time period after the new legislation became enacted. The dependent variable is *Switch*, being 1 if the household changed his (main) bank between *t-1* and *t*, and 0 otherwise. All control variables in vector X are lagged one period. Robust standard errors in the parentheses, clustered at the province level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	(1)	(2)	(3)	(4)
Treated	-0.094*	-0.104*	-0.206***	-0.233***
	(0.055)	(0.053)	(0.062)	(0.069)
Post	0.077***	0.072***	0.046	-0.002
	(0.028)	(0.026)	(0.039)	(0.042)
Treated x Post	0.151***	0.156***	0.246***	0.255***
	(0.056)	(0.057)	(0.073)	(0.082)
Medium education			0.074**	0.063*
			(0.036)	(0.036)
High education			0.060	0.054
			(0.048)	(0.049)
Household size			0.021	0.018
			(0.015)	(0.014)
Age			0.004	0.004
			(0.007)	(0.007)
Age^2			-0.003	-0.002
			(0.007)	(0.006)
Male			-0.065	-0.062
			(0.045)	(0.042)
Married			-0.068*	-0.071**
			(0.035)	(0.031)
Risk-averse			-0.010	-0.008
			(0.027)	(0.027)
Homeowner			-0.032	-0.034
			(0.047)	(0.039)
Employee			0.054*	0.065**
			(0.032)	(0.032)
Self-employed			0.119***	0.106**
			(0.044)	(0.047)
Income – Q2			0.064	0.063
			(0.056)	(0.056)
Income – Q3			0.040	0.027
			(0.054)	(0.055)

Table 3 (continued)

Income – Q4			-0.008	-0.003
			(0.055)	(0.054)
Income – Q5			-0.023	-0.025
			(0.067)	(0.069)
Net Wealth – Q2			-0.064	-0.045
			(0.052)	(0.049)
Net Wealth – Q3			0.029	0.063
			(0.061)	(0.055)
Net Wealth – Q4			0.009	0.030
			(0.055)	(0.054)
Net Wealth – Q5			-0.047	-0.021
			(0.072)	(0.071)
The only bank used			-0.085**	-0.087***
			(0.036)	(0.032)
Cooperative Bank				-0.078
				(0.048)
Savings Bank				0.032
				(0.071)
ROA				0.110
				(0.084)
Bank Size (in logs)				0.077***
				(0.015)
M&A				-0.006
				(0.048)
Macro_Regions controls	NO	YES	YES	YES
Municipality Size controls	NO	YES	YES	YES
Observations	2,898	2,898	2,380	2,291
R-squared	0.013	0.023	0.051	0.100

Table 4: Bersani Law and switching: Education split

The table replicates the results from Table 3 on two subsamples differentiated based on the household head's level of education. Panel A reports the results for a subsample of households whose head completed at least secondary school, whereas Panel B reports the results for those who did not obtain a secondary-school degree.

Independent variables	(1)	(2)	(3)	(4)
PANEL A: Having at least a secondary school degree				
Treated	-0.133**	-0.141**	-0.223***	-0.259***
	(0.057)	(0.057)	(0.057)	(0.065)
Post	0.077**	0.073**	0.062	0.022
	(0.036)	(0.034)	(0.045)	(0.050)
Treated x Post	0.169***	0.173***	0.257***	0.269***
	(0.060)	(0.063)	(0.075)	(0.086)
Macro_Regions controls	NO	YES	YES	YES
Municipality size controls	NO	YES	YES	YES
Bank characteristics	NO	NO	NO	YES
Household characteristics	NO	NO	YES	YES
Observations	2,279	2,279	1,904	1,832
R-squared	0.015	0.023	0.055	0.102
PANEL B: Without a secondary school degree				
Treated	0.309	0.332	0.453*	0.445*
	(0.213)	(0.214)	(0.258)	(0.240)
Post	0.057	0.057	-0.032	-0.109
	(0.036)	(0.039)	(0.087)	(0.082)
Treated x Post	-0.175	-0.213	-0.385	-0.328
	(0.265)	(0.258)	(0.314)	(0.287)
Macro_Regions controls	NO	YES	YES	YES
Municipality size controls	NO	YES	YES	YES
Bank characteristics	NO	NO	NO	YES
Household characteristics	NO	NO	YES	YES
Observations	619	619	476	459
R-squared	0.014	0.029	0.074	0.152

Table 5: Bersani Law and switching: Competition split

The table replicates the results from Table 3 on two subsamples differentiated based on the proxy for competition in the province of the household residence: the Herfindahl index computed from the number of ATMs of banks operating in the province. Panel A reports the results for a subsample of households in a province with a Herfindahl index higher than the median in a given year (i.e., relatively low competition), whereas Panel B reports the results for those who reside in a province with a Herfindahl index lower than the median in a given year (i.e., relatively high competition).

Independent variables	(1)	(2)	(3)	(4)
PANEL A: Low competition				
Treated	-0.119*	-0.103*	-0.185**	-0.224**
	(0.061)	(0.060)	(0.082)	(0.087)
Post	0.106***	0.125***	0.122*	0.077
	(0.037)	(0.042)	(0.066)	(0.062)
Treated x Post	0.173**	0.159**	0.213**	0.243**
	(0.069)	(0.072)	(0.095)	(0.098)
Macro_Regions controls	NO	YES	YES	YES
Municipality size controls	NO	YES	YES	YES
Bank characteristics	NO	NO	NO	YES
Household characteristics	NO	NO	YES	YES
Observations	1,532	1,532	1,280	1,223
R-squared	0.024	0.051	0.083	0.138
PANEL B: High competition				
Treated	-0.067	-0.080	-0.142	-0.153*
	(0.080)	(0.084)	(0.086)	(0.085)
Post	0.037	0.071*	0.020	-0.033
	(0.057)	(0.042)	(0.061)	(0.067)
Treated x Post	0.124	0.124	0.166	0.159
	(0.081)	(0.096)	(0.103)	(0.113)
Macro_Regions controls	NO	YES	YES	YES
Municipality size controls	NO	YES	YES	YES
Bank characteristics	NO	NO	NO	YES
Household characteristics	NO	NO	YES	YES
Observations	1,366	1,366	1,100	1,068
R-squared	0.005	0.046	0.103	0.144

Table 6: Robustness: Placebo test

The table replicates the results from Table 3 using a sample of non-mortgage owners and a treatment indicator that singles out households that reported having a consumer and/or personal loan. Robust standard errors in the parentheses, clustered at the province level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	(1)	(2)	(3)	(4)
Treated	0.103	0.097	-0.148	-0.197*
	(0.192)	(0.184)	(0.123)	(0.102)
Post	0.083***	0.079***	0.053	0.034
	(0.024)	(0.021)	(0.033)	(0.037)
Treated x Post	-0.225	-0.217	0.018	0.087
	(0.182)	(0.169)	(0.082)	(0.075)
Medium education			0.056	0.046
			(0.038)	(0.037)
High education			0.090	0.106
			(0.065)	(0.067)
Household size			0.033**	0.032**
			(0.015)	(0.015)
Age			0.008	0.006
			(0.006)	(0.006)
Age^2			-0.006	-0.003
			(0.006)	(0.005)
Male			-0.035	-0.032
			(0.043)	(0.044)
Married			-0.113***	-0.120***
			(0.032)	(0.032)
Risk-averse			-0.009	-0.009
			(0.034)	(0.031)
Homeowner			-0.031	-0.044
			(0.052)	(0.049)
Employee			0.062	0.063
			(0.045)	(0.043)
Self-employed			0.153***	0.147***
			(0.047)	(0.050)
Income – Q2			0.064	0.055
			(0.060)	(0.058)
Income – Q3			0.025	0.011
			(0.068)	(0.067)
Income – Q4			-0.001	-0.004
			(0.062)	(0.063)
Income – Q5			-0.015	-0.026
			(0.070)	(0.069)

Table 6 (continued)

Net Wealth – Q2			-0.059	-0.017
			(0.049)	(0.047)
Net Wealth – Q3			0.039	0.086
			(0.073)	(0.069)
Net Wealth – Q4			-0.001	0.037
			(0.069)	(0.066)
Net Wealth – Q5			-0.064	-0.020
			(0.083)	(0.081)
The only bank used			-0.049	-0.053
			(0.044)	(0.037)
Cooperative Bank				-0.111**
				(0.042)
Savings Bank				0.053
				(0.071)
ROA				0.003
				(0.095)
Bank Size (in logs)				0.081***
				(0.013)
M&A				0.006
				(0.061)
Macro_Regions controls	NO	YES	YES	YES
Municipality Size controls	NO	YES	YES	YES
Observations	3,263	3,263	2,385	2,299
R-squared	0.009	0.022	0.053	0.103

Table 7: Robustness: Fixed effects estimation

The table reports the results for regressions of the form:

$$y_{it} = \alpha_i + \Upsilon_t + \beta\,(\mathbf{Treated}_i \times \mathbf{Post}_t) + \mathbf{X}_{it-1}\,\theta + \varepsilon_{it},$$

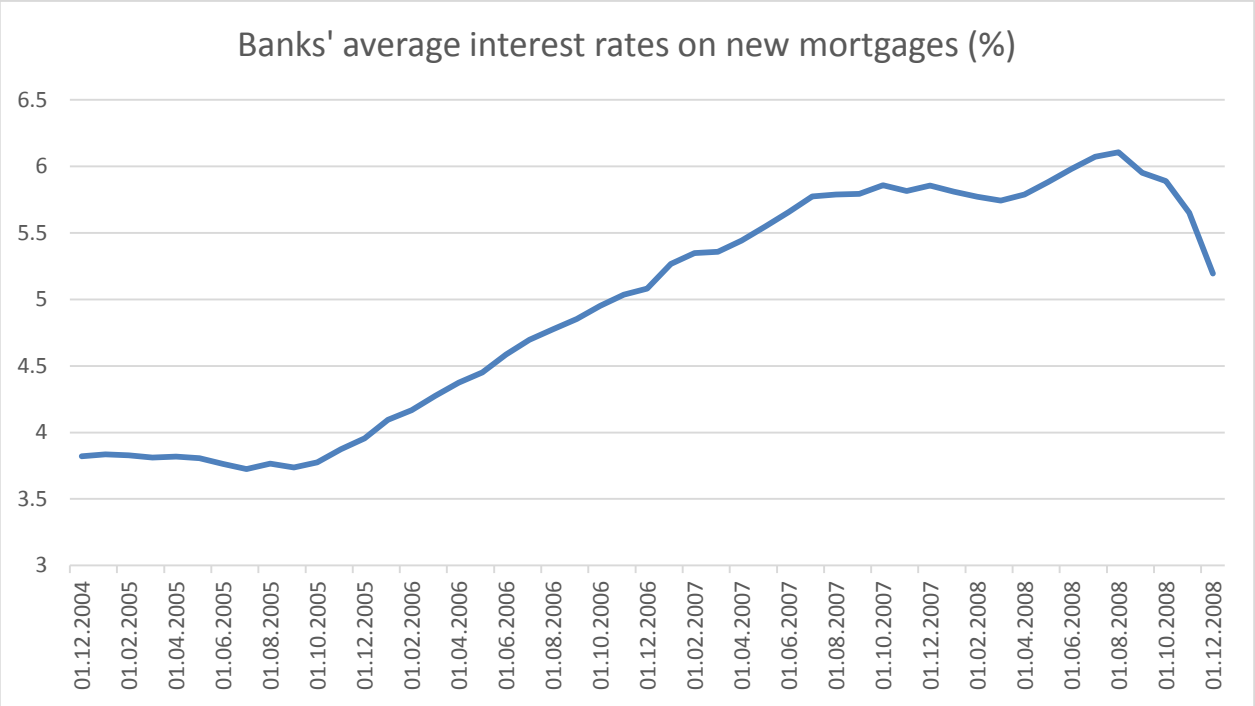
where i indexes households, t indexes the year, and β is the difference-in-differences estimate corresponding to the coefficient on the interaction term of $Treated$ and $Post$. $Treated_i$ indicates the households that in the panel always reported having a mortgage. We drop the households that take out a mortgage in *t* or pay it off between *t-1* and *t*. $Post_t$ indicates the time period after the new legislation became enacted. The dependent variable is *Switch*, being 1 if the household changed its (main) bank between *t-1* and *t*, and 0 otherwise. All control variables in vector X are lagged one period. Robust standard errors in the parentheses, clustered at the household level. All regressions are estimated using fixed effects model. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Panel A reports the results for the full sample, whereas Panels B and C report the results for the two subsamples differentiated based on the proxy for competition in the province of the household residence.

Independent variables	(1)	(2)	(3)	(4)
PANEL A: Full sample				
Treated x Post	0.056	0.060	0.178*	0.198**
	(0.070)	(0.072)	(0.096)	(0.101)
T2008	0.077***	0.074***	0.101***	0.096**
	(0.025)	(0.025)	(0.036)	(0.038)
T2010	-0.035	-0.040	-0.027	-0.026
	(0.026)	(0.026)	(0.044)	(0.044)
T2012	-0.079***	-0.085***	-0.078	-0.094*
	(0.029)	(0.029)	(0.055)	(0.056)
Observations	2,070	2,061	1,739	1,696
Number of households	770	768	732	719
R-squared	0.028	0.030	0.056	0.083

Table 7 (continued)

PANEL B: Low competition				
Treated x Post	0.135	0.141	0.304**	0.317**
	(0.114)	(0.114)	(0.141)	(0.137)
T2008	0.107***	0.102***	0.141**	0.147**
	(0.037)	(0.037)	(0.057)	(0.061)
T2010	0.000	-0.006	0.052	0.064
	(0.036)	(0.037)	(0.069)	(0.070)
T2012	-0.012	-0.022	0.056	0.049
	(0.043)	(0.044)	(0.091)	(0.090)
Observations	1,171	1,171	1,006	982
Number of households	584	584	538	531
R-squared	0.032	0.037	0.082	0.099
PANEL C: High competition				
Treated x Post	-0.047	-0.046	0.002	0.107
	(0.133)	(0.134)	(0.250)	(0.257)
T2008	0.107***	0.106***	0.213***	0.187***
	(0.040)	(0.041)	(0.073)	(0.069)
T2010	0.003	0.002	0.093	0.088
	(0.050)	(0.051)	(0.086)	(0.074)
T2012	-0.095*	-0.096*	-0.003	-0.030
	(0.054)	(0.054)	(0.096)	(0.075)
Observations	878	878	721	702
Number of households	457	457	415	403
R-squared	0.046	0.046	0.126	0.186
Bank controls	NO	NO	NO	YES
Household controls	NO	NO	YES	YES
Macro_Regions controls	NO	YES	YES	YES
Municipality Size controls	NO	YES	YES	YES

Figure 3: Interest rates trend



Source: Bank of Italy, Base Dati Statistica

Table 8: Bersani Law and new mortgages

The table reports the results for regressions of the form:

$$y_{it} = \beta_0 + \beta_1 Add\ Mortgage_{it} + \beta_2 Broad\ Relationship_{it-1} + \beta_3 Add\ Mortgage_{it}\ x\ Broad\ Relationship_{it-1} + X_{it-1}\theta + \varepsilon_{it},$$

where i indexes households and t indexes the year. $Add\_Mortgage_{it}$ indicates the households that did not hold a mortgage with their (main) bank in *t-1* and they take out a mortgage in *t*. $Broad\ Relationship_{it-1}$ is a dummy being 1 if in *t-1* a household uses more than one bank service in addition to a bank account. We drop the households that already had a mortgage in *t-1*. All control variables in vector X are lagged one period. In all regressions, we control for the full set of household characteristics (household size, homeownership, income, wealth, household head's employment status, age, gender, marital status, education, risk-aversion, and exclusivity of the household's relationship with the bank). Robust standard errors in the parentheses, clustered at the province level. All regressions are estimated using ordinary least squares and the sample weights. The sample is split with regard to the introduction of the Bersani Law on 1 February 2007. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Independent variables	2004-2006	2008-2012	2004-2006	2008-2012
Add Mortgage	0.051	0.145***	0.091	0.129***
	(0.064)	(0.039)	(0.073)	(0.036)
Broad Relationship	-0.057	-0.047**	-0.038	-0.052**
	(0.046)	(0.022)	(0.048)	(0.023)
Add Mortgage x Broad Relationship			-0.190	0.076
			(0.129)	(0.102)
T2010		-0.112***		-0.113***
		(0.030)		(0.030)
T2012		-0.121***		-0.121***
		(0.025)		(0.025)
Macro_Regions controls	YES	YES	YES	YES
Municipality Size controls	YES	YES	YES	YES
Observations	1,490	5,596	1,490	5,596
R-squared	0.074	0.046	0.076	0.047

3.A. Appendix

Table A1: Description of variables

Variable	**Description**	**Data source**
Dependent variable		
Switch	Binary variable taking value 1 if between *t-1* and *t* a household changes its (main) bank, 0 otherwise.	SHIW
Regressors		
Treated	Binary variable taking value 1 if a household has a mortgage still outstanding with its (main) bank, and 0 otherwise.	SHIW
Post	Binary variable taking value 1 if the year of observation falls after the Law 40/2007 was introduced in 2007.	SHIW
Add mortgage	Binary variable taking value 1 if a household does not have a mortgage with the (main) bank in wave *t-1*, but has a mortgage in wave *t*, and 0 otherwise.	SHIW
Broad Relationship	Binary variable taking value 1 if a household uses more than 1 bank service (in addition to a bank account), and 0 otherwise.	SHIW
Age, Age^2	Integer variables representing the age of the household head and its quadratic form.	SHIW
Male	Binary variable taking value 1 for a male household head, 0 for female.	SHIW
Married	Binary variable taking value 1 if the household head is married, and 0 otherwise.	SHIW
Medium Education, High Education	Binary variables taking value 1 for the corresponding level of education: Medium education corresponds to having completed secondary school and/or college; High education corresponds to having obtained a graduate and/or post-graduate degree. The reference category is Low education, i.e., having completed only primary education or having no education at all.	SHIW
Household size	Categorical variable counting the number of household members.	SHIW
Risk-averse	Binary variable taking value 1 if risk aversion level is 4, 0 otherwise. The risk-aversion level is obtained by means of a categorical variable representing the preferred risk profile of financial investments: 1 = High risk, high returns; 2 = Reasonable risk, good returns 3 = Low risk, reasonable returns; 4 = No risk, low returns	SHIW
Income (Net Wealth) quintiles	Binary variables taking value 1 if the household's yearly disposable income (net wealth, defined as the sum of real and financial assets, net of liabilities) is within the relevant distribution quintiles, and 0 otherwise.	SHIW
Homeowner	Binary variable taking value 1 if a household owns its primary residence, and 0 otherwise.	SHIW

Variable	**Description**	**Data source**
Employee, Self-employed	Binary variables taking value 1 for household heads being in the corresponding occupational status, 0 otherwise. Reference category is "non-working position".	SHIW
The only bank used	Binary variable taking value 1 if a household has only one bank, 0 otherwise.	SHIW
Commercial, Cooperative, Savings	Binary variables taking value 1 for the corresponding bank's specialization. The reference category is Commercial bank.	BS
Return on Assets (ROA)	Variable representing the ratio between the bank's pre-tax profits and assets, in percentage points.	BS
Size	Bank's total assets, in logs.	BS
M&A	Dummy variable taking value 1 if the bank underwent a process of Merge & Acquisition between *t-1* and *t*, and 0 otherwise.	BS
Time dummies (T2010, T2012)	Dummy variables taking value 1 in the relevant year, and 0 otherwise. The reference category is 2008.	SHIW
Regional dummies	Dummy variables taking value 1 for the relevant macro-region (North-West, Centre, South), and 0 otherwise. The reference category is North-East.	SHIW
Municipality size	Categorical variable representing the size of the residential municipality: 1 = less than 5,000; 2 = [5,000-20,000]; 3 = [20,000-50,000]; 4 = [50,000-200,000]; 5 = more than 200,000 The model specifications include four dummies for municipality size from 2 to 5, i.e., the reference category is 1 (municipality size less than 5,000)	SHIW
Competition proxy	Normalized Herfindahl index of banks' ATM points in the province of the household residence, ranging between 0 (perfect competition) and 1 (monopoly).	BI

Note*: SHIW is Survey on Household Income and Wealth; BS is Bankscope; BI is Bank of Italy.*

Table A2: Bersani Law and switching

The table reports the results for regressions of the form:
$y_{it} = \alpha_0 + \alpha_1 Treated_{it} + \alpha_2 Post_t + \alpha_3 (Treated_{it} \times Post_t) + X_{it-1}\theta + \varepsilon_{it}$,
where i indexes households, t indexes year, and α_3 is difference-in-differences estimate corresponding to the coefficient on the interaction term of $Treated$ and $Post$. $Treated_{it}$ indicates the households that reported having a mortgage both in *t-1* and in *t*. The control group consists of all households that reported not having a mortgage in either *t-1* nor in *t*. $Post_t$ indicates the time period after the new legislation was introduced. The dependent variable is *Switch*, being 1 if the household changed its (main) bank between *t-1* and *t*, and 0 otherwise. All control variables in vector X are lagged one period. Robust standard errors in the parentheses, clustered at the province level. All regressions are estimated using ordinary least squares and the sample weights. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	(1)	(2)	(3)	(4)
Treated	-0.091	-0.113	-0.217***	-0.244***
	(0.083)	(0.077)	(0.068)	(0.075)
Post	0.078**	0.071**	0.050	0.002
	(0.030)	(0.028)	(0.039)	(0.041)
Treated x Post	0.108	0.119	0.214**	0.221**
	(0.094)	(0.090)	(0.094)	(0.105)
Medium education			0.068*	0.061
			(0.039)	(0.038)
High education			0.030	0.036
			(0.054)	(0.055)
Household size			0.033**	0.030**
			(0.015)	(0.014)
Age			0.005	0.004
			(0.007)	(0.007)
Age^2			-0.003	-0.002
			(0.007)	(0.006)
Male			-0.064	-0.061
			(0.042)	(0.042)
Married			-0.103***	-0.102***
			(0.037)	(0.033)
Risk-averse			0.002	-0.000
			(0.028)	(0.028)
Homeowner			-0.023	-0.029
			(0.056)	(0.051)
Employee			0.043	0.050
			(0.033)	(0.033)
Self-employed			0.132**	0.109**
			(0.051)	(0.053)

Table A2 (continued)

Income – Q2			0.086*	0.079
			(0.051)	(0.050)
Income – Q3			0.074	0.050
			(0.056)	(0.057)
Income – Q4			0.017	0.015
			(0.057)	(0.055)
Income – Q5			0.002	-0.014
			(0.067)	(0.069)
Net Wealth – Q2			-0.070	-0.040
			(0.055)	(0.054)
Net Wealth – Q3			0.010	0.049
			(0.068)	(0.064)
Net Wealth – Q4			-0.017	0.016
			(0.058)	(0.058)
Net Wealth – Q5			-0.062	-0.023
			(0.069)	(0.068)
The only bank used			-0.080*	-0.072**
			(0.041)	(0.034)
Cooperative Bank				-0.086**
				(0.041)
Savings Bank				0.011
				(0.067)
ROA				0.130*
				(0.068)
Bank Size (in logs)				0.073***
				(0.015)
M&A				-0.030
				(0.050)
Macro_Regions controls	NO	YES	YES	YES
Municipality Size controls	NO	YES	YES	YES
Observations	2,545	2,545	2,089	2,015
R-squared	0.010	0.023	0.057	0.104